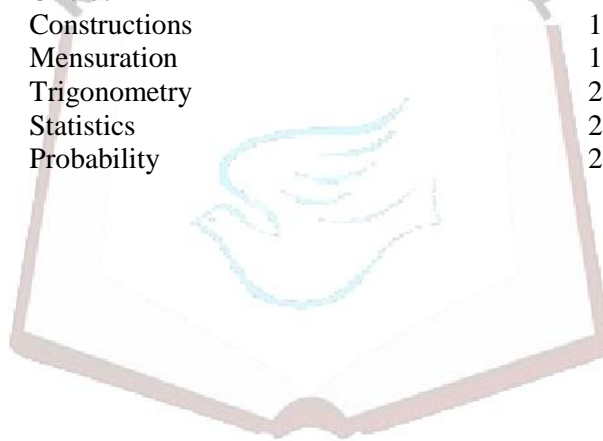


## Mathematics

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## Ch 1. Goods and Service Tax

- Mr. C of Chennai supplied goods/services for ₹20,000 to Mr. M of Madurai. Mr. M supplied goods/services for ₹24,000 to Mr. S of Salem. SGST and CGST rate on supply of goods and services is 9% each. IGST rate is 18%. Find the following: (a) Total price charged by Mr. C. (b) Calculate the GST paid by Mr M. [A: (a) ₹23,600 (b) ₹720]
- Mr. A registered person under GST located in Tamil Nadu, sold goods worth ₹10,000 after manufacture to Mr. C of Chennai. Subsequently, Mr. C sold these goods to Mr. H of Hyderabad for ₹17,500. Mr. H being a trader finally sold these goods to customer Mr. S of Secunderabad for ₹30,000. Applicable rates of CGST= 9%, SGST=9% and IGST=18%. Find (a) the net tax liability of Mr C and (b) total revenue to the centre. [A: (a) ₹1350 (b) ₹2700]
- Mr. M of Maharashtra supplied goods/services for ₹35,000 to Mr. P of Pune. Mr. M purchased goods/services for ₹23,600 (inclusive of IGST 18%) from Mr. C of Tamil Nadu. SGST and CGST rate on supply of goods and services is 9% each. Find the following: (a) Total price charged by Mr. M for supply of goods/services and (b) Net GST liability of Mr. M. [A: (a) ₹41300 (b) ₹2700]
- The catalogue price of a computer set is ₹42,000. The shopkeeper gives a discount of 10% on the listed price. He further gives an off season discount of 5% on the discounted price. However, If CGST rate is 4%, calculate the total tax paid by the customer. [A: ₹2,872.80]
- A dealer bought the goods at the list price of ₹4,50,000 with 20% trade discount and sold the same whole goods at the list price of ₹6,00,000 with 30% trade discount. If GST rate is 18%, calculate the total tax paid by dealer. [A: ₹10,800]
- A dealer in Delhi sells an electronic item to a retailer in Delhi listed at ₹85,000. If the GST rate on items is 28% , Calculate the GST paid by the retailer. Find the price of the item to be paid by retailer. [A: ₹23,800, ₹1,08,800]
- A dealer in Mumbai sells some building material to a retailer in Bhopal listed at ₹2,50,000. If the rate of GST is 18%, Calculate the total tax paid by the retailer. Find the price of the material to be paid by retailer. [A: ₹45,000, ₹2,95,000]
- Mrs Lata has a leather coat manufacturer unit in state A. She buys raw materials worth ₹80,000 from a supplier from state B at a discount of 10%. She sells her product worth ₹2,20,000 outside the state. If the rate of CGST @ 2.5%, find the IGST payable of Mrs Lata. [A: ₹7400]
- Mr Abdul a manufacturer, sells his product worth ₹2,25,000 within the state. He buys goods worth ₹1,20,000 within the state. If the rate of GST is @ 12% on the raw material and @ 18% on the finished product. Find the amount of GST he has to pay. [A: ₹26,100]
- A shopkeeper buys a mobile at a discount of 30% from the wholesaler of the same state, the printed price of the mobile being ₹2,000. The shopkeeper sells it to the buyer at the printed price. GST is @ 8% on the goods Find: i) The price at which the mobile can be bought. ii) The GST paid by the shopkeeper. [A: i. ₹2,160 ii. ₹48]
- A shopkeeper bought an article at a discount of 40% of the listed price of ₹3,000. The shopkeeper offers a discount of 10% of the listed price to his customer. If the GST rate is 12%., Find: i) the amount paid by the customer, ii) the tax to be paid by the shopkeeper under GST. [A: i. ₹3,024 ii. ₹108]
- A manufacture from Agra marks an article for ₹4800. He sells 100 piece of it to a wholesaler of Jaipur at a discount of 25% on the marked price and the wholesaler sells them to a retailer within state at a discount of 15% on the its marked price. If the retailer sells them to a consumer without any discount and GST is @ 8%. Calculate the amount of GST received by the Government from: i) the wholesaler ii) the retailer. [A: i. ₹3840 ii. ₹5760]
- The list price of an article is ₹3,000. A shopkeeper sells the article to a consumer at the list price. The prescribed GST rate is @ 12% on article. If the shopkeeper pays a SGST of ₹30 to the state government, at what price inclusive of sales tax did the shopkeeper buy the article from the wholesaler of the same state? [A: ₹2,800]
- A shopkeeper buys an article whose list price is ₹4,500 at some rate of discount from a wholesaler within state. He sells the article to a consumer at the list price .GST is @ 6% on the article. If the shopkeeper has to pay a GST of ₹81; find: (i) the rate of discount at which he bought the article from the wholesaler. (ii) the total money paid by the shopkeeper, including tax, to buy the article. [A: (i) 30% (ii) ₹3,339]
- A manufacturing company sold a commodity to its distributor for ₹22,000 including GST. The distributor sold the commodity to a retailer for ₹22,000 excluding tax and the retailer sold it to customer for ₹25,000 plus tax (under GST). If the GST rate of tax is 10% and all transactions took place within state, what was the (i) sale price of the commodity for the manufacturer? (ii) the amount of tax received by the state Government on the sale of the commodity? [A: (i) ₹20,000 (ii) ₹1,250]
- During a financial year, a shopkeeper purchased goods worth ₹4,15,000 from other states and paid a total tax of ₹38,000. His sales during this period consisted of a taxable turnover of ₹50,000 for goods taxable at 5% and ₹3,20,000 for goods taxable at 12%(under GST). He also sold tax exempted goods worth ₹45,000 during this period. Calculate his tax liability for financial year. [A: ₹2,900]
- In the tax period, M/S Hari Singh & Sons from Chennai purchased floor tiles worth ₹8,00,000 from Jaipur taxable at 7.5% (under GST) and sanitary fittings worth ₹7,50,000 from Delhi taxable at 10% (under GST). During this period, the sales turnover for floor tiles and sanitary fittings are worth ₹8,40,000 and ₹9,20,000 respectively. However the floor tiles worth ₹60,000 were returned by the firm during the same period. Calculate the tax liability of the firm for this tax period. [A: ₹15,500]

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18. A shopkeeper buys 15 identical articles for ₹ 840. He sells 6 of these articles for ₹ 65 each. GST is @ 8% on the goods Calculate the GST paid by the shopkeeper against the sale of these six articles. [A: ₹4.32]

## Ch 2. Banking

- Joseph deposits ₹ 300 per month in a recurring deposit account in a post office for  $2\frac{1}{4}$  years. If the annual rate of interest is 9%, find the amount payable to him on maturity. [A: ₹8950.50]
- Mr Jacob has a 2 year recurring deposit account in Bank of Baroda and deposits ₹950 per month. If he receives ₹ 25,056.25 at the time of maturity, find (i) the rate of simple interest. (ii) the total interest earned by Mr. Jacob. [A: (i) 9.5% (ii) ₹2256.25]
- Mrs Vasundhara Mehta has a recurring deposit account in a bank for 2 year 5 months at 10% p.a. simple interest. She gets ₹4350 as the interest on maturity. Find (i) the monthly instalment (ii) the maturity amount. [A: (i) ₹1,200 (ii) ₹9,150]
- Ms Susan needs ₹30,618 after 42 months. Find the money she should invest per month in a recurring deposit scheme to get the required amount, when the rate of interest is 12% p.a. [A: ₹600]
- Samita has a recurring deposit account in a bank of ₹200 per month at the rate of 9% p.a. If she gets ₹11,364 at the time of maturity, find the total time in year for which account was held. How many instalments did she pay? [A: 4 year, 48 instalments]
- Ahmed has a recurring deposit account in a bank. He deposits ₹400 per month for 3 years. If he gets ₹16,176 at the time of maturity, find i) The interest paid by the bank ii) the rate of interest. [A: (i) ₹1,776 (ii) 8%]
- Mrs A. kaur deposits ₹140 per month in a bank for 4 years. If the maturity value of her deposits is ₹8,092; find the rate of interest per annum. [A: 10%]
- Meena has a R.D. Account in the Punjab national Bank and deposited ₹1,200 per month. If the maturity value of this account is ₹12,440 and the rate of interest is 8% per annum; find the time for which the account was held. [A: 10 month]
- Ankita started paying ₹400 per month in a 3 year recurring deposit. After six months her brother Anshul started paying ₹500 per month in a two and a half years recurring deposit. The bank paid 10% p.a. simple interest for both. At maturity who will get more money and by how much? [A: Anshul, ₹317.50]
- Mr Rishabh needs ₹30,000 after 2 years, what least money (in multiple of Rs 5) must he deposit every month in R.D. account to get after 2 years, the rate of interest being 8% p.a. ? [A: ₹1155]
- Priyanka has a recurring deposit account of ₹600 per month at 10% per annum. If she gets ₹2325 as interest at the time of maturity, find the total time for which the account was held. [A: 30 months]

## Ch3. Shares and Dividends

- Which is better investment: 7% ₹100 shares quoted at ₹120 or, 8% ₹10 shares at ₹13.50. [A: 2<sup>nd</sup>]
- By investing ₹7,500 in 10% ₹100 shares, Arun receives an annual income of ₹500. How many shares did he buy? [A: 50]
- A man buys a ₹40 share in a company, which pays 10% dividend. He buys the share at such a price that his profit is 16% in his investment. At what price did he buy the share? [A: ₹25]
- How much should a man invest in ₹100 shares selling at ₹85 to obtain an annual income of ₹1,800; if the dividend declared is 12%. Also find his yield percent, to the nearest whole number. [A: ₹12,750, 14%]
- (i) A dividend of 10% was declared on shares with a certain face value quoted at ₹50. If the rate of return is 12%, calculate the face value of the share. (ii) A dividend of 12% was declared on ₹150 shares selling at a certain price. If the rate of return is 10%, calculate the market value of the share. [A: (i) ₹60 (ii) ₹180]
- A man invested ₹45,000/- in 15% ₹100/- shares quoted at ₹125/-. When the market value of these shares rose to ₹140/- he sold some shares, just enough to raise ₹8,400/- calculate: i) The number of shares he still holds; ii) The dividend due to him on these remaining shares. [A: (i) 300 (ii) ₹4500 ]
- Mr. Tiwari invested ₹20,020 in 15% ₹26 shares quoted at a premium of 10%. Calculate: i) The number of shares bought by Mr. Tiwari. ii) Mr. Tiwari's income from the investment. iii) The percentage yield. [A: (i) 700 (ii) ₹2,730 (iii) 13.64%]
- Ajay owns 350 shares of a company. The face value of each share is ₹100. The company declares a dividend of 12%. Calculate: i) The dividend that Ajay will get. ii) The rate of interest on his investment, if Ajay had paid ₹120 for each share. [A: (i) ₹4,200 (ii) 10%]
- A company with 4000 shares of nominal value of ₹20 each declares an annual dividend of 9.6%. Calculate: i) The total amount of dividend paid by the company. ii) The annual income of Shahrukh who holds 400 shares in the company. iii) If he received only 12% on his investment, find the price he paid for each share. [A: (i) ₹7,680 (ii) ₹768 (iii) ₹16]
- Amit Kumar invests ₹8,640 in buying ₹25 shares at ₹11 premium. The dividend is 12% per annum. Find: i) The number of shares he buys ii) His yearly dividend iii) The percentage return on his investment. Give answer correct to the nearest whole number. [A: (i) 240 (ii) ₹720 (iii) 8.33%]
- A man invests ₹8,000 on ₹100 shares at ₹160. If the company pays him 8% dividend find: i) the number of shares he buys. ii) his total dividend iii) his percentage return on the shares. [A: (i) 50 (ii) ₹400 (iii) 5% ]



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12. Vivek invests ₹720 in 12%, ₹15 shares at ₹12. After a year, when the shares when the price rises to ₹21, he sold these shares and invests the proceeds in 8% ₹6 shares at ₹9. Calculate i) the dividend for the first year. ii) the sale proceeds iii) the change in his annual income from dividend. [A: (i) ₹108 (ii) ₹1260 (iii) ₹40.80 less]
13. Mr. Parekh invested ₹52,000 on ₹100 shares at a discount of ₹20 paying 8% dividend. At the end of one year he sells the shares at a premium of ₹20. Find i) the annual dividend ii) the profit earned including his dividend. [A: (i) ₹5200 (ii) ₹31200]
14. Mr Sharma has 160 shares of nominal value of ₹100 and he decides to sell them when they are at a premium of 55%. He invests the proceeds in shares of nominal value ₹20, quoted at 20% discount, paying 20% dividend annually. Calculate i) the sale proceeds ii) the number of shares he buys iii) his annual dividend from these shares. [A: (i) ₹24,800 (ii) ₹1,550 (iii) ₹6.200]
15. By selling at ₹77, some 2.25% shares of face value ₹100, and investing the proceeds in 6% shares of face value ₹100, selling at ₹110, a person increased his income by ₹117 per annum. How many shares did he sell? [A: 60]
16. A man has a choice to invest in hundred rupees shares of two companies A and B. Shares of company A are available at a discount of 10% and it pays 7% dividend whereas shares of company B are available at a premium of 20% and it pays 8% dividend. If the man invests equally in both the companies and the sum of the return from them is ₹936, find how much, in all does he invested? [A: ₹12,960]
17. Divide A man invests ₹40,608 into two parts such that if one part is invested in 8% ₹100 shares at 8% discount and the other part is invested in 9% ₹100 shares at 8% premium, the annual incomes, from both the investments, are equal. [A: ₹19,872 and ₹20,736]
18. Ashok and Sandeep invest ₹18,000 each in buying shares of two different companies. Ashok buys 7.5% ₹100 shares at a discount of 20%, whereas Sandeep buys ₹50 shares at a premium of 20%, if both receive equal dividend at the end of the year, find the rate of dividend received by Sandeep. [A: 11.25%]
19. Jacob had 1,000 shares of a company with a face value of ₹40 and paying 8% dividend. He sold some of these shares at a discount of 10% and invested the proceeds in ₹20 shares at a premium of 50% and paying 12% dividend. If the change in his income is ₹192, find the number of shares sold by John. [A: 600]
20. A man buys 9% hundred rupees shares selling at a certain price. The rate of interest which he gets on his investment is 7.5%. (i) Calculate the market value of the share. (ii) If he wants to increase his annual income by ₹630 how many extra shares should he buy? [A: (i) ₹120 (ii) 70]
21. A man invests ₹10800 partly in 15% ₹25 shares at ₹30 and partly in 7% ₹10 shares at ₹12. If his total income is ₹870, how much has he invested in each? [A: ₹3600 and ₹7200]
22. A person invested 20%, 30% and 25% of his savings in buying shares at par values of three different companies, which declare dividends of 10%, 12% and 15% respectively. If his total income as dividends be ₹4675, find his savings. [A: 50,000]
23. Mr Shameem invested  $33\frac{1}{3}\%$  of his savings in 20% ₹50 shares at 20% premium and the remainder of the savings in 10% ₹100 shares at ₹10 premium. If his total income from these investments is ₹9200; find, (i) his total savings (ii) the number of ₹50 shares. [A: (i) ₹79,200 (ii) 440]

## Ch4. Linear Inequations

1. Solve and graph the solution set on number line:
- (i)  $y - 3(2+y) > 2(3y - 1)$ ,  $y \in \{-3, -2, -1, 0, 1, 2\}$  [A:  $\{-3, -2, -1\}$ ]
- (ii)  $7 \leq -4y + 2 < 12$ ,  $y \in \mathbb{R}$  [A:  $\{y: -\frac{5}{2} < y \leq -\frac{5}{4}, y \in \mathbb{R}\}$ ]
- (iii)  $30 - 4(2y - 1) < 30$ ,  $y$  is a positive integer. [A:  $\{1, 2, 3, \dots\}$ ]
- (iv)  $\frac{11-2y}{5} \geq \frac{9-3y}{8} + \frac{3}{4}$ ,  $y \in \mathbb{N}$  [A:  $\{1, 2, 3, \dots, 13\}$ ]
- (v)  $\frac{y}{2} + 5 \leq \frac{y}{3} + 6$ , where  $y$  is a positive odd integer. [A:  $\{1, 3, 5\}$ ]
- (vi)  $3 \geq \frac{y-4}{2} + \frac{y}{3} \geq 2$ ,  $y \in \mathbb{I}$  [A:  $\{5, 6\}$ ]
- (vii)  $-2\frac{1}{2} + 2y \leq \frac{4y}{5} \leq \frac{4}{3} + 2y$ ,  $y \in \mathbb{W}$ . [A:  $\{0, 1, 2\}$ ]
- (viii)  $2y - 3 \geq y + \frac{1-y}{3} > \frac{2}{5}y$ ,  $y \in \mathbb{R}$  [A:  $\{y: y \geq \frac{5}{2}, y \in \mathbb{R}\}$ ]
- (ix)  $-2 < \frac{1}{2} - \frac{2x}{3} \leq 1\frac{5}{6}$ ,  $y \in \mathbb{N}$  [A:  $\{1, 2, 3\}$ ]
- (x)  $1 - \frac{4}{25}(2y - 1) < 1$ ;  $y \in \mathbb{N}$  [A:  $\{1, 2, 3, \dots\}$ ]
2. Given:  $P = \{y: 5 < 2y - 1 \leq 11, y \in \mathbb{R}\}$ ,  $Q = \{y: -1 \leq 3 + 4y < 23, y \in \mathbb{I}\}$ . Represent P and Q on number lines. Find the range of set  $P \cap Q$  and represent it on number line. [A:  $\{4\}$ ]

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3. If P is the solution set of  $-3y + 4 < 2y - 3$ ,  $y \in \mathbb{N}$ , Q is the solution set of  $4y - 5 < 12$ ,  $y \in \mathbb{W}$ , find (i)  $P \cap Q$  (ii)  $Q - P$ .  
[A: (i) {2,3,4} (ii) {0,1}]
4. If P is the solution set of  $-2y + 3 < -y + 5 \leq 11 - 2y$ ,  $y \in \mathbb{R}$ , Q is the solution set of  $-y - 5 \leq 3y - 13 < 2y - 5$ ,  $y \in \mathbb{R}$ , find (i)  $P \cup Q$  (ii)  $P - Q$  (iii)  $P \cap Q'$ .  
[A: (i)  $\{y: -2 < y < 8, y \in \mathbb{R}\}$  (ii)  $\{y: -2 < y < 2, y \in \mathbb{R}\}$  (iii)  $\{y: -2 < y < 2, y \in \mathbb{R}\}$ ]
5. Find the smallest value of y for  $y - 3(2 - y) < 2(3y - 1)$ ; when  $y \in \mathbb{N}$ .  
[A: 1]
6. Find the smallest value of y for which,  $5 - 2y < 5\frac{1}{2} - \frac{5}{3}y$  where y is an integer.  
[A: -1]
7. Find the largest value of x for which  $2(x-1) \leq 9 - x$  and  $x \in \mathbb{W}$   
[A: 3]
8. If the replacement set is the set of integers, (I or Z), between -6 and 8, find the solution set of  $3 - 3x > x - 15$ .  
[A:  $\{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4\}$ ]
9. Find the set of values of x, satisfying:  $7x + 3 \geq 3x - 5$  and  $\frac{x}{4} - 5 \leq \frac{5}{4} - x$ , where  $x \in \mathbb{N}$ .  
[A:  $\{1, 2, 3, 4, 5\}$ ]
10. Solve the inequation:  $\frac{5x+1}{7} - 4\left(\frac{x}{7} + \frac{2}{5}\right) \leq 1\frac{3}{5} + \frac{3x-1}{7}$ ,  $x \in \mathbb{R}$ .  
[A:  $\{x: x \geq -\frac{51}{5}, x \in \mathbb{R}\}$ ]

## Ch5. Quadratic Equations in one variable

1. Find the values of x if  $p-2=0$ ,  $q+15=0$  and  $x^2+px+q=2$ .  
[A: 3.242, -5.242]
2. Find the values of a and b such that  $x=2$ ,  $x=-1$  are solutions of the quadratic  $x^2+ax+b=0$ .  
[A: -1, -2]
3. Find the value of 'K' for which  $x=3$  is a solution of the quadratic equation,  $(K+2)x^2 - Kx + 6 = 0$ . Thus find the other root of the equation.  
[A:  $k = -4$ ,  $x = -1$ ]
4. Solve the quadratic equation :
- (i)  $(2x+3)(3x-2)+2=0$  (ii)  $\sqrt{2}x^2+7x+5\sqrt{2}=0$  (iii)  $x^2-(\sqrt{2}+1)x+\sqrt{2}=0$   
(iv)  $\sqrt{3}x^2-2\sqrt{2}x-2\sqrt{3}=0$  (v)  $4x^2+4bx-(a^2-b^2)=0$  (vi)  $2x^2+ax-a^2=0$   
(vii)  $x^2-4ax(b^2-4a^2)=0$  (viii)  $\frac{2}{3}x^2-\frac{1}{3}x=1$  (ix)  $x^2+x-(a+2)(a+1)=0$   
(x)  $\frac{x-2}{x+2}+\frac{x+2}{x-2}=4$  (xi)  $\frac{x+1}{x+3}=\frac{3x+2}{2x+3}$  (xii)  $\frac{1}{x-2}+\frac{1}{x-3}+\frac{1}{x-4}=0$
- [Ans: (i)  $\frac{1}{2}, -\frac{4}{3}$  (ii)  $-\sqrt{2}, -\frac{5}{\sqrt{2}}$  (iii)  $1, \sqrt{2}$  (iv)  $-\sqrt{\frac{2}{3}}, \sqrt{6}$  (v)  $\frac{-b-a}{2}, \frac{-b+a}{2}$  (vi)  $-a, \frac{a}{2}$   
(vii)  $0, 4a(b^2-4a^2)$  (viii)  $-1, \frac{3}{2}$  (ix)  $(a+1), -(a+2)$  (x)  $\pm 2\sqrt{3}$  (xi)  $-3 \pm \sqrt{6}$  (xii)  $3 \pm \frac{1}{\sqrt{3}}$ ]
5. Solve the quadratic equation and give your answer correct to
- (i) two decimal places: (a)  $5x(x+2)=3$  (b)  $4x-\frac{3}{x}=5$   
(ii) two significant figure: (a)  $x-\frac{18}{x}=6$  (b)  $4x^2-7x+2=0$   
(iii) three significant figure:  $5x^2-3x-4=0$   
[A: (i) (a) 0.26, -2.26 (b) 7.69, -0.44 (ii) (a) 8.2, -2.2 (b) 1.4, 0.36 (iii) 1.24, -0.643]
6. Without solving the quadratic equation, find the value of 'm' for which the given equation has real and equal roots:
- (i)  $x^2+2(m-1)x+(m+5)=0$  (ii)  $mx^2-4x+3=0$   
(iii)  $mx^2-2\sqrt{5}mx+15=0$  (iv)  $x^2-2x(1+3m)+7(3+2m)=0$   
(v)  $(m-5)x^2+2(m-5)x+2=0$  (vi)  $mx(x-7)+49=0$   
(vii)  $y^2+m^2=2(m+1)y$  (viii)  $x^2-(3m-1)x+2m^2+2m-11=0$   
[A: (i) 4, -1 (ii)  $\frac{4}{3}$  (iii) 3 (iv) 2,  $-\frac{10}{9}$  (v) 7 (vi) 4 (vii)  $-\frac{1}{2}$  (viii) 9, 5]
7. Find the values of m so that the quadratic equation (i)  $3x^2-5x-2m=0$  has two distinct real roots. (ii)  $3x^2-mx+5=0$  has real roots.  
[A: (i)  $m > -\frac{25}{24}$  (ii)  $m \leq -2\sqrt{15}$  or,  $m \geq 2\sqrt{15}$ ]
8. The sum of the squares of two consecutive natural numbers is 313. Find the numbers.  
[A: 12, 13]
9. A two digit number is such that the product of its digits is 12. When 36 is added to this number; the digits interchange their places. Find the number.  
[A: 26]
10. Find two natural numbers which differ by 3 and the sum of whose square is 117.  
[A: 9, 6]
11. The sum S of first n natural numbers is given by the relation:  $s = \frac{1}{2}n(n+1)$ . Find n, if the sum is 276.  
[A: 23]
12. Five times of a certain whole number is equal to three less than twice the square of the number. Find the number.  
[A: 3]
13. Divide 8 into two parts such that the sum of their reciprocal is  $\frac{8}{15}$ .  
[A: 3&5]
14. Find a positive number which when decreased by 20 is equal to 69 times its reciprocal.  
[A: 23]
15. The product of the two positive numbers is 91. Find the numbers if the larger is 1 less than twice the other?  
[A: 13, 7]

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16. In a two digit number, the one's digit is twice the ten's digit. The difference of the squares of the digits exceeds the larger digit by 40. Find the two numbers. [A: 48]
17. A two digit number is such that the product of the digit is 14. When 45 are added to the number, then the digits interchange their places. Find the number. [A: 27]
18. A two digit number is four times the sum of its digit and twice the product of the digits .Find the number. [A: 36]
19. A positive number is divided into two parts such that the sum of the squares of the two parts is 208. The square of the larger part is 18 times the smaller part. Taking x as the smaller part of the two parts, find the number. [A:  $8+12 = 20$ ]
20. ₹480 is divided equally among 'x' children. If the number of children were 20 more than each would have got ₹12 less. Find 'x'. [A: 20]
21. By increasing the speed of a car by 10 km/hr, the time of journey for a distance of 72 km is reduced by 36 minutes. Find the original speed of the car. [A: 30 km/hr]
22. A man travels 200 km with a uniform speed. The distance could have been covered in 2hrs less, had the speed been increased by 5km/h. calculate the man's original speed. [A: 20 km/hr]
23. The speed of an express train is x km/h and the speed of an ordinary train is 12 km/h less than that of the express train. If the ordinary train takes one hour longer than the express train to cover a distance of 240 km, find the speed of the express train. [A: 60 km/hr]
24. A car covers a distance of 400 km at a certain speed. Had the speed been 12 km/h more, the time taken for the journey would have been 1 hour 40 minutes less. Find the original speed of the car. [A: 48 km/hr]
25. A motor-boat, whose speed is 9km/h in still water, goes 12 km downstream and comes back in a total time of 3 hours. Find the speed of the stream. [A: 3 km/hr]
26. Car B travels 5km more than car A for every liter of petrol. If car A uses 4 liters of petrol more than car B in covering 400km, determine the number of liters of petrol used by car B for the journey. [A: 16 liters]
27. A shopkeeper buys a certain number of books for ₹720. If the cost per book was ₹5 less; the number of books that could be bought for ₹720 would be 2 more. Find the original cost of each book. [A: ₹45]
28. Five years ago, a woman's age was the square of her son's age. Ten years later her age will be twice that of her son's age. Find: i) The age of the son five years ago. ii) The present age of the woman. [A: (i) 5yr (ii) 30 yr]
29. The product of Ramu's age (in years) five year ago and his age (in years) nine years later is 15. Determine Ramu's present age. [A: 6 year]
30. Two years ago a man's age was three times the square of his son's age. In three years time, his age will be four times his son's age .Find the present ages. [A: 29yr, 5yr]
31. Some students planned a picnic. The budget for the food was Rs 480. As eight of them failed to join the party, the cost of the food for each member increased by Rs 10. Find how many students went for the picnic. [A: 16]
32. By selling an article for ₹24, a trader loses as much percent as the cost price of the article. Calculate the cost price. [A: ₹ 60 or ₹40]
33. A piece of cloth costs ₹200. If the piece was 5m longer and each meter costs ₹2 less; the cost of the piece would have remained unchanged. How long is the piece and what is the original rate per meter? [A: 20m; ₹10/m]
34. The hypotenuse of a right triangle is 13 cm and the difference between the other two sides is 7 cm. find the two unknown sides of the triangle. [A: 12cm, 5cm]
35. The length of the rectangle exceeds its width by 8 cm & the area of the rectangle is 240 sq cm. Find its dimensions. [A: 20cm; 12cm]
36. The length of a veranda is 3m more than its breadth. The numerical value of its area is equal to the numerical values of its perimeter. Find the dimensions of the veranda. [A: 6 x 3 m<sup>2</sup>]
37. For the same amount of work, A takes 6 hours less than B. If together they complete the work in 13 hours 20minutes; find how much time B alone will take to complete the work. [A: 30hr]
38. One pipe can fill a cistern in 3 hrs less than another. The two pipes together can fill the cistern in 6hrs 40mins, find the time each pipe will take to fill cistern. [A: 15hr, 12hr]
39. If two pipes function simultaneously, the reservoir will be filled in 12 hrs. One pipe fills the reservoir 10 hrs faster than the other. How many hrs does it take the second pipe to fill the reservoir? [A: 30hr]
40. The difference of the squares of two natural numbers is 84. The square of the larger number is 25 times the smaller number. Find the numbers. [A: 10, -4]
41. The product of two consecutive natural numbers which are multiples of 3 is equal to 810. Find the two numbers. [A:27,30]

## Ch6. Ratio and Proportion

1. If  $A:B=\sqrt{5}:2^3$  then find it's (i) duplicate ratio (ii) triplicate ratio (iii) reciprocal ratio. [A:(i) 5:64(ii)  $5\sqrt{5}:512$ (iii)  $8:\sqrt{5}$ ]
2. If  $A: B = \frac{1}{9a^6} : \frac{1}{64}$  then find it's (i) sub-duplicate ratio. (ii) sub-triplicate ratio. (iii) reciprocal ratio. [A:(i)  $8:3a^3$ (ii)  $4:\sqrt[3]{9} a^2$  (iii)  $9a^6:64$  ]



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3. (i) Find value of x, if  $(3x+1) : (5x+3)$  is the triplicate ratio of 3:4.  
 (ii) If  $x:y=5:3$ , find  $(3x^2-2xy+5y^2) : (2x^2+xy+7y^2)$ .  
 (iii) Find x:y if  $\frac{x^3+12x}{6x^2+8} = \frac{y^3+27y}{9y^2+27}$  [A: (i)  $\frac{17}{57}$  (ii) 45:64 (iii) 2:3]
4. (i) If  $A : B = 4 : \frac{1}{5}$ ,  $B:C = 5:7$ , and  $C:D = \frac{1}{9} : \frac{1}{11}$ , find A:D  
 (ii) Find compounded ratio of  $\frac{1}{5} : \frac{1}{4}$ ,  $\frac{1}{5} : \frac{1}{7}$  and 9:11. [A: (i) 1100:63 (ii) 252:275]
5. (i) Find y : x if (a)  $(5x^2-3y^2):xy = 11:2$  (b)  $(x+2y):(2x-y)$  is equal to the duplicate ratio of 3 : 2.  
 (ii) If  $\frac{3x+5y}{3x-5y} = \frac{7}{3}$ , then find: (a) x:y (b)  $\frac{x^2+y^2}{x^2-y^2}$  [A: (i) (a) 2:3 (b) 14:17 (ii) (a) 25:6 (b) 661:589]
6. (i) If  $\frac{a}{b} = \frac{c}{d} = \frac{e}{f}$ , prove that  $\frac{(a^3+c^3)^2}{(b^3+d^3)^2} = \frac{e^6}{f^6}$   
 (ii) If a,b,c,d are in proportion, prove that :  $\frac{(a+c)^3}{(b+d)^3} = \frac{a(a-c)^2}{b(b-d)^2}$   
 (iii) If a,b,c are in continued proportion, prove that  $(a+b+c)(a-b+c) = a^2 + b^2 + c^2$   
 (iv) If  $\frac{x^2+y^2}{x^2-y^2} = \frac{17}{8}$ , then find  $\frac{x^3+y^3}{x^3-y^3}$  [A:  $\frac{76}{49}$ ]
7. If a,b,c are in continued proportion, prove that  
 (i)  $\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3} = \frac{a}{b^2c^2} + \frac{b}{c^2a^2} + \frac{c}{a^2b^2}$  (ii)  $(a+b)^2 : (b+c)^2 = (a^2+b^2):(b^2+c^2)$
8. (i) If  $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ , prove that  $\frac{x^3}{a^2} + \frac{y^3}{b^2} + \frac{z^3}{c^2} = \frac{(x+y+z)^3}{(a+b+c)^2}$   
 (ii) If  $ax = by = cz$ , prove that  $\frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy} = \frac{bc}{a^2} + \frac{ca}{b^2} + \frac{ab}{c^2}$
9. (i) If  $a:b :: c:d$ , prove that  $(2a+3b)(2c-3d) = (2a-3b)(2c+3d)$ .  
 (ii) If  $\frac{5x+7y}{5u+7v} = \frac{5x-7y}{5u-7v}$ , show that  $\frac{x}{y} = \frac{u}{v}$
10. (i) If  $x = \frac{8ab}{a+b}$ , find the value of  $\frac{x+4a}{x-4a} + \frac{x+4b}{x-4b}$   
 (ii) If  $x = \frac{\sqrt{a+1}+\sqrt{a-1}}{\sqrt{a+1}-\sqrt{a-1}}$ , using properties of proportion show that  $x^2-2ax+1 = 0$  [A: (i) 2]
11. Using componendo and dividendo  
 (i) Find a : b, when  $\frac{a^3+3ab^2}{b^3+3a^2b} = \frac{63}{62}$  (ii) Prove that  $b^2 = \frac{2a^2x}{x^2+1}$ , when  $x = \frac{\sqrt{a^2+b^2}+\sqrt{a^2-b^2}}{\sqrt{a^2+b^2}-\sqrt{a^2-b^2}}$ , [A: (i) 3:2]
12. Using the properties of proportion, solve for x :  
 (i)  $\frac{x^3+3x}{3x^2+1} = \frac{341}{91}$  (ii)  $\frac{1+x+x^2}{1-x+x^2} = \frac{62(1+x)}{63(1-x)}$  (iii)  $\frac{\sqrt{5x}+\sqrt{2x-6}}{\sqrt{5x}-\sqrt{2x-6}} = 4$  (iv)  $\frac{x^4+1}{2x^2} = \frac{17}{8}$  [A: (i) 11 (ii)  $\frac{1}{5}$  (iii) 30 (iv)  $\pm 2$ ]
13. Solve for x:  
 (i)  $\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}} = \frac{a}{b}$  (ii)  $\frac{3x+\sqrt{9x^2-5}}{3x-\sqrt{9x^2-5}} = 5$  (iii)  $\frac{\sqrt{a+x}+\sqrt{a-x}}{\sqrt{a+x}-\sqrt{a-x}} = \frac{c}{d}$  [A: (i)  $\frac{2ab}{a^2+b^2}$  (ii) 1 (iii)  $\frac{2acd}{c^2+d^2}$ ]
14. When 6 is the mean proportion between two numbers x and y and 48 is the third proportional of x and y. Find the numbers. [A: 3,12]
15. What number must be added to each of the numbers 5, 11, 19 and 37 so that they are in proportion? [A: 2]
16. What number should be subtracted from each of the numbers 23, 30, 57 and 78 so that the remainders are in proportion? [A: 6]
17. What number must be added to each of the numbers 16, 26 and 40 so that they may be in continued proportion? [A: 9]
18. The monthly pocket money of Ravi and Sanjeev are in the ratio 5:7. Their expenditures are in the ratio 3:5. If each save ₹80 every month, find their monthly pocket money. [A: ₹200, ₹280]
19. Two numbers are in ratio 7:11. If the difference between them is 10, find the numbers. [A: 17.5, 27.5]
20. The sum of two numbers is 18 and their difference is 8. Find the ratio between the larger and smaller number. [A: 13:5]
21. A sum of money is divided between Marry and Jean in the ratio 5:8. If Marry's share is ₹225, find the total amount of money. [A: Rs585]
22. The income of a man is increased in the ratio 10:11. If the increase in his income is ₹600 per month, find his new income. [A: ₹6600 per month]
23. The sides of a triangle are in the ratio 7:5:3 and its perimeter is 30cm. Find their lengths. [A: 14cm, 10cm, 6cm]

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24. If the angles of a triangle are in the ratio 2:3:4. Find the angles. [A:  $40^\circ, 60^\circ, 80^\circ$ ]
25. A certain sum was divided among A, B and C in the ratio 7:5:4. If B got ₹500 more than C, find the total sum divided. [A: ₹8000]
26. In a business, A invests ₹50000 for 6 months; B invests ₹60000 for 4 months and C invests ₹80000 for 5 months. If they together earn ₹18800, find the share of each. [A: ₹6000, ₹4800, ₹8000]
27. In a mixture of 45 litres, the ratio of milk to water is 13:2. How much water must be added to this mixture to make the ratio of milk to water as 3:1. [A: 7 litres]
28. A bag contains Rs 102 in the form of 1-rupee, 50-paise and 25-paise coins in the ratio of 16:5:28. Find the total number of coins. [A: 196]
29. The ratio of the number of boys to the girls in a class changes from 4:3 to 2:1, if there were 20 more boys and 12 less girl. Find total number of student in the class. [A: 154]
30. The following numbers,  $k+3$ ,  $k+2$ ,  $3k-7$  and  $2k-3$  are in proportion. Find  $k$ . [A: -1,5]

## Ch7. Factorisation of polynomials

1. The polynomials  $kx^3+3x^2-4$  and  $2x^3-5x+4k$  when divided by  $x+3$  leave the same remainder. Find the value of  $k$ . [A:  $k=2$ ]
2. Use factor theorem to factorize the following polynomials completely:  
(i)  $x^3+2x^2-5x-6$  (ii)  $x^3-13x-12$  [A: (i)  $(x+1)(x-2)(x+3)$  (ii)  $(x+1)(x+3)(x-4)$ ]
3. Show that  $(x+4)$  is a factor of  $x^3+x^2-10x+8$ . Hence factorize the given expression. [A:  $(x-1)(x+4)(x-2)$ ]
4. If  $(2x+1)$  is a factor of  $6x^3+5x^2+ax-2$ , find the value of  $a$ . [A:  $a=-3$ ]
5. What number must be added to  $4x^3-8x^2+3x$  so that the resulting polynomial has a factor  $2x+1$ . [A: 4]
6. If  $(x-2)$  is a factor of  $2x^3-x^2-px-2$ , then find the value of  $P$  and with this value factorize the expression. [A:  $P=5; (x-2)(x+1)(2x+1)$ ]
7. Find the value of the constants  $a$  and  $b$ , if  $(x-2)$  and  $(x+3)$  are both factors of the expression  $x^3+ax^2+bx-12$ . [A:  $a=3, b=-4$ ]
8. If  $(x+2)$  and  $(x-3)$  are factors of  $x^3+ax+b$ , find the values of  $a$  and  $b$ . And with these values of  $a$  and  $b$ , factorize the given expression. [A: -7, -6;  $(x+2)(x-3)(x+1)$ ]
9.  $(x-2)$  is a factor of the expression  $x^3+ax^2+bx+6$ . When this expression is divided by  $(x-3)$ , it leaves the remainder 3. Find the values of  $a$  and  $b$ . [A:  $a=-3, b=-1$ ]
10. If  $ax^3+3x^2+bx-3$  has a factor  $(2x+3)$  and leaves remainder  $-3$  when divided by  $(x+2)$ , find the values of  $a$  and  $b$ . With these values of  $a$  and  $b$ , factorize the given expression. [A:  $a=2, b=-2; (2x+3)(x-1)(x+1)$ ]
11. For what value of 'p',  $(x-p)$  is a factor of  $p(x^3-px^2+1)+x+1$ . [A:  $p=-\frac{1}{2}$ ]
12. Find the remainders obtained when  $x^3+(kx+8)x+k$  is divided by  $x+1$  and  $x-2$ . Hence find  $k$ , if the sum of two remainders is 1. [A:  $2k-9, 5k+24, -2$ ]

## Ch8. Matrices

1. If  $A = \begin{bmatrix} 2 & 1 \\ 1 & -2 \end{bmatrix}$ , compute  $(-A)^2$  and  $(-A)^3$ .
2. Evaluate:  $\begin{bmatrix} 2\cos 60^\circ & -2\sin 30^\circ \\ -\tan 45^\circ & \cos 0^\circ \end{bmatrix} \begin{bmatrix} \cot 45^\circ & \operatorname{cosec} 30^\circ \\ \sec 60^\circ & \sin 90^\circ \end{bmatrix}$
3. Show that  $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$  is a solution of the matrix equation  $x^2-2x-3I=0$  where  $I$  is the unit matrix of order 2.
4. Given the matrices:  $A = \begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 4 \\ -1 & -2 \end{bmatrix}$ ,  $C = \begin{bmatrix} -3 & 1 \\ 0 & -2 \end{bmatrix}$ , Find  
i.  $A(BC)$  ii.  $A(CB)$  iii.  $AC+B^2-10C$  iv.  $(AB)C$
5. Find the matrix  $x$  of order  $2 \times 2$  which satisfy the equation:  
 $\begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} 0 & 2 \\ 5 & 3 \end{bmatrix} + 2x = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix}$
6. If  $A = \begin{bmatrix} 1 & 1 \\ x & x \end{bmatrix}$ , find the value of  $x$  so that  $A^2 = 0$
7. Find the value of  $x$  and  $y$  if  $\begin{bmatrix} x+y & y \\ 2x & x-y \end{bmatrix} \begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$
8. Evaluate  $x, y$  if  $\begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 2x \\ 1 \end{bmatrix} + 2 \begin{bmatrix} -4 \\ 5 \end{bmatrix} = \begin{bmatrix} 8 \\ 4y \end{bmatrix}$
9. If  $A = \begin{bmatrix} 1 & 4 \\ 0 & -1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & x \\ 0 & -1 \\ 2 \end{bmatrix}$ , Find the value of  $x$  if  $AB = BA$
10. If  $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ , Find  $x, y$  so that  $A^2 = xA + yI$ .



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11. Let  $M \times \begin{bmatrix} 1 & 1 \\ 0 & 2 \end{bmatrix} = \begin{bmatrix} 1 & 2 \end{bmatrix}$  where M is a matrix. (i) State the order of the matrix M. (ii) Find the matrix M.
12. If  $A = \begin{bmatrix} 2 & -1 \\ -4 & 5 \end{bmatrix}$  and  $B = \begin{bmatrix} -3 \\ 2 \end{bmatrix}$ , find matrix C such that  $AC = B$ .
13. Given  $A = \begin{bmatrix} 1 & 1 \\ -2 & 0 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & -1 \\ 1 & 1 \end{bmatrix}$ . Solve for matrix X:  $3A - 2X = X - 2B$
14. Find the positive integers p and q such that :  $\begin{bmatrix} p & q \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} 25 \end{bmatrix}$
15. If  $\begin{bmatrix} p & q \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix} = \begin{bmatrix} 25 \end{bmatrix}$  and  $\begin{bmatrix} -p & q \end{bmatrix} \begin{bmatrix} 2p \\ q \end{bmatrix} = \begin{bmatrix} -2 \end{bmatrix}$ ; find p and q, if : (i)  $p, q \in W$  (ii)  $p, q \in Z$
16. If  $A = \begin{bmatrix} 0 & -1 \\ 4 & -3 \end{bmatrix}$ ,  $B = \begin{bmatrix} -5 \\ 6 \end{bmatrix}$  and  $3A \times M = 2B$ ; find matrix M.
17. If matrix  $X = \begin{bmatrix} -3 & 4 \\ 2 & -3 \end{bmatrix} \begin{bmatrix} 2 \\ -2 \end{bmatrix}$  and  $2X - 3Y = \begin{bmatrix} 10 \\ -8 \end{bmatrix}$ ; find the matrix X and Y.
18. If  $A = \begin{bmatrix} 1 & 2 \\ -2 & 3 \end{bmatrix}$ ,  $B = \begin{bmatrix} -2 & -1 \\ 1 & 2 \end{bmatrix}$  and  $C = \begin{bmatrix} 0 & 3 \\ 2 & -1 \end{bmatrix}$  and  $A + 2B = 3C + M$ ; find matrix M.
19. If  $A = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$ , find matrix B such that  $A^2 - 2B = 3A + 5I$  where I is a 2 x 2 identity matrix.
20. Prove that  $\sin A \begin{bmatrix} \sin A & -\cos A \\ \cos A & \sin A \end{bmatrix} + \cos A \begin{bmatrix} \cos A & \sin A \\ -\sin A & \cos A \end{bmatrix} = I$  where I is a 2 x 2 identity matrix.

Ans:

1.  $\begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$  &  $\begin{bmatrix} -10 & 4 \\ 10 & -14 \end{bmatrix}$     2.  $\begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix}$     4.(i)  $\begin{bmatrix} -15 & -7 \\ -30 & -14 \end{bmatrix}$  (ii)  $\begin{bmatrix} -18 & -24 \\ -36 & -48 \end{bmatrix}$  (iii)  $\begin{bmatrix} 29 & -6 \\ -13 & 20 \end{bmatrix}$  (iv)  $\begin{bmatrix} -15 & -7 \\ -30 & -14 \end{bmatrix}$
5.  $\begin{bmatrix} -17 & -16 \\ -12 & -5 \end{bmatrix}$     6.  $x = -1$     7.  $x = -1, y = 5$     8.  $x = 3, y = 2$     9.  $x = 5$     10.  $x = 4, y = -1$
11. (i)  $1 \times 2$  (ii)  $\begin{bmatrix} 1 & \frac{1}{2} \end{bmatrix}$     12.  $\begin{bmatrix} -13/6 \\ -4/3 \end{bmatrix}$     13.  $\begin{bmatrix} \frac{7}{3} & \frac{1}{3} \\ -\frac{4}{3} & \frac{2}{3} \end{bmatrix}$     14.  $P = 3$  and  $q = 4$  or,  $p = 4$  and  $q = 3$
15. (i)  $p = 3, q = 4$  (ii)  $p = \pm 3, q = \pm 4$     16.  $\begin{bmatrix} \frac{7}{2} \\ \frac{10}{3} \\ \frac{1}{3} \end{bmatrix}$     17.  $X = \begin{bmatrix} -14 \\ 10 \end{bmatrix}$      $Y = \begin{bmatrix} -38 \\ 3 \\ 28 \\ 3 \end{bmatrix}$     18.  $\begin{bmatrix} -3 & -9 \\ -6 & 10 \end{bmatrix}$     19.  $\begin{bmatrix} -\frac{5}{2} & -1 \\ 0 & -\frac{7}{2} \end{bmatrix}$

## Ch9. Arithmetic and Geometric Progression

1. For the A.P 3,1,-1,-3,...., Write the first term and common difference? [A:  $a=3, d=-2$ ]
2. Write the next term of an AP  $\sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$  [A:  $\sqrt{50}$ ]
3. Find the 10<sup>th</sup> term of the A.P, whose first term is 2 and common difference is 5 [A: 47]
4. Find the 8<sup>th</sup> term of an A.P. 7,10,13,....? [A: 28]
5. Which term of the A.P : 21,18,15,.... is -81? [A: 35]
6. Which term of AP 7.3,6.9, 6.5 ..... is first negative term. [A: 20]
7. If the numbers  $x-2, 4x-1$  and  $5x+2$  are in A.P. Find the value of x. [A: 1]
8. For what value of n the n<sup>th</sup> term of AP is 63, 65, 67, ..... and 3,10,17,..... are equal. [A: 13]
9. Find the 20<sup>th</sup> term from the last term of an AP 3, 8,13, ..... 253. [A: 158]
10. Determine the A.P whose 3<sup>rd</sup> term is 5 and 7<sup>th</sup> term is 9? [A: 3,4,5,6....]
11. Find the common difference of an A.P. whose first term is  $\frac{1}{2}$  and the 8<sup>th</sup> term is 17. Also write its 4<sup>th</sup> term. [A:  $d = \frac{1}{3}, a_4 = \frac{3}{2}$ ]
12. Find the sum of first 10 terms of the A.P 2,5,8,11,.....? [A: 155]
13. Find the sum of integers between 100 and 200 that are divisible by 9. [A: 1683]
14. Find the sum of the first 31 terms of an AP. Whose n<sup>th</sup> term is given by  $3 + \frac{2n}{3}$ . [A:  $\frac{1271}{3}$ ]
15. Determine the AP whose 3<sup>rd</sup> term is 16 and when 5<sup>th</sup> term is subtracted from 7<sup>th</sup> term, we get 12. [A: 4, 10, 16, ...]
16. If the 8<sup>th</sup> term of an A.P is 31 and 15<sup>th</sup> term is 16 more than the 11<sup>th</sup> term, find the A.P. [A: 3, 7, 11, ...]
17. If the arithmetic mean between 3a, and 2a-7 is a+4, then find a. [A: 5]
18. The sum of the 4<sup>th</sup> and 8<sup>th</sup> term of an A.P is 24 and the sum of the 6<sup>th</sup> term and 10<sup>th</sup> term is 44. Find the first three terms of the A.P. [A: -13,-8,-3]
19. The angles of triangle are in A.P. The greatest angle is twice the least. Find all the angles of the triangle. [A: 40°, 60°, 80°]
20. Find the common difference of an AP whose first term is 1 and the sum of the first four terms is one third to the sum of the next four terms. [A: 2]
21. If  $S_n$  the sum of first n term of an A.P. is given  $S_n = 3n^2 - 4n$ , then find its n<sup>th</sup> term. [A: 6n-7]
22. The ratio of the sums of m and n terms of an AP is  $m^2 : n^2$ , so that the ratio of m<sup>th</sup> and n<sup>th</sup> terms is (2m-1): (2n-1)

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23. The sum of the first three terms of an A.P. is 42 and the product of the first and third term is 52. Find the first term and the common difference. [A: 26 or 2,  $\pm 12$ ]  
\*\*\*\*\*
24. (i) Find the next term of the sequence  $1/6, 1/3, 2/3...$   
(ii) Find the 15<sup>th</sup> term of the series  $\sqrt{3}, 1/\sqrt{3}, 1/3\sqrt{3}, \dots$  [A: (i)  $\frac{4}{3}$  (ii)  $3^{-27/2}$ ]
25. Which term of the series (i)  $1, 1/3, 1/9, 1/(27)...$  is  $1/(243)$  (ii)  $3, -3\sqrt{3}, 9, \dots$  is 729? [A: (i) 6<sup>th</sup> (ii) 11<sup>th</sup>]
26. (i) Determine the 12<sup>th</sup> term of a G.P. whose 8<sup>th</sup> term is 192 and common ratio is 2.  
(ii) Find the number of terms of a G.P. whose first term is  $3/4$ , common ratio is 2 and the last term is 384.  
(iii) Find the geometric series whose 4<sup>th</sup> term is 54 and the 7<sup>th</sup> term is 1458.  
(iv) The 4<sup>th</sup> term of a G.P. is the square of its second term and the first term is -3. Determine its 7<sup>th</sup> term. [A: (i) 3072 (ii) 10 (iii) 2,6,18,54,... (iv) -2167]
27. Find the value of x such that  
(i)  $-2/7, x, -7/2$  are three consecutive terms of a G.P.  
(ii)  $x, x+3, x+9$  are first three terms of a G.P. [A: (i)  $\pm 1$  (ii) 3]
28. The lengths of the sides of a triangle form a G.P. If the perimeter of the triangle is 37 cm and the shortest side is of length 9 cm, find the lengths of the other two sides. [A: 12cm, 16cm]
29. Find the sum of (i) 20 terms of the series  $2+6+18+\dots$  (ii) 10 terms of series  $1+\sqrt{3}+3+\dots$   
(iii) 100 terms of  $0.7+0.07+0.007+\dots$  (iv) the series  $81-27+9-\dots-1/27$   
[A: (i)  $30^{-20}-1$  (ii)  $121(\sqrt{3}+1)$  (iii)  $\frac{7}{9}(1-10^{-100})$  (iv)  $60\frac{20}{27}$  ]
30. (i) How many terms of the sequence  $3, 6, 12, \dots$  will have their sum equal to 189?  
(ii) How many terms of the sequence  $3, 3/2, 3/4, \dots$  will give the sum  $3069/512$ ?  
(iii) How many terms of the sequence  $1, \sqrt{2}, 2, 2\sqrt{2}, \dots$  will give a sum of  $1023(\sqrt{2}+1)$ ? [A: (i) 6 (ii) 10 (iii) 20]
31. (i) If the first term of a G.P. is 5 and the sum of first three terms is  $31/5$ , find the common ratio.  
(ii) The sum of first three terms of a G.P. is to the sum of first six terms as 125 : 152. Find the common ratio of the G.P.  
(iii) In a G.P. the first term is 7, the last term is 448, and the sum is 889. Find the common ratio.  
(iv) The sum of first three terms of a G.P. is 16 and sum of the next 3 terms is 128. Determine the first term, common ratio and sum to n terms of the G.P.  
(v) The first and last term of a G.P. are 1 and 256 respectively. If the common ratio is 4, find: (a) 'n' the number of terms of the G.P. (b) sum of the n terms. [A: (i)  $\frac{1}{5}$  or  $-\frac{6}{5}$  (ii)  $\frac{3}{5}$  (iii) 2 (iv)  $\frac{16}{7}, 2, 16(2^n - 1)/7$  (v) 5, 341]

## Ch10. Co-ordinate Geometry

1. KM is a straight line of 13 units. If K has the co-ordinates (2, 5) and M has the co-ordinates (x, -7) find the possible values of x. [A: 7 or -3]
2. The line joining P(-4, 5) and Q(3, 2), intersects the y axis at R. PM and QN are perpendiculars from P and Q on the x axis Find: i) The ratio PR : RQ ii) The co-ordinates of R iii) The areas of the quadrilateral PMNQ. [A: (i) 4:3 (ii)  $(0, \frac{23}{7})$  (iii) 24.5sq unit]
3. The line segment joining A(2,3) and B(6,-5) is intersected by the X-axis at the point K. Write the ordinate of the point K. Hence find the ratio in which K divides AB. [A: 0; 3:5]
4. Find the coordinates of the centroid of a triangle whose vertices are: A(-1,3), B(1,-1) and C(5,1). [A:  $(\frac{5}{3}, 1)$ ]
5. The midpoint of the line segment joining (2a, 4) and (-2, 2b) is (1, 2a + 1). Find the value of a and b. [A: a = 2, b = 3]
6. If the line joining the points A(4, -5) and B(4, 5) is divided by the point P such that AP:AB = 2:5 find the co-ordinates of P. [A: (4, -1)]
7. If A = (-4, 3) and B = (8, -6) i) find the length of AB ii) In what ratio is the line joining AB, divided by the line y = -3. [A: (i) 15 units (ii) 2:1]
8. ABC is a triangle and G(4, 3) is the centroid of the triangle. If A = (1, 3), B = (4, b) and C = (a, 1), find 'a' and 'b'. Find the length of side BC. [A: 5 units]
9. Given a line segment AB joining the points A(-4, 6) and B(8, -3). Find: i) the ratio in which AB is divided by the y-axis. ii) find the coordinates of the point of intersection. iii) the length of AB. [A: (i) 1:2 (ii) (0,3) (iii) 15 units]
10. The centre O of a circle has the co-ordinates (4,5) and one point on the circumference is (8,10). Find the co-ordinates of the other end of the diameter of the circle through this point. [A: (0,0)]
11. A(10,5), B(6,-3) and C(2,1) are the vertices of the triangle ABC. L is the midpoint of AB and M is the midpoint of AC. Write down the co-ordinates of L and M. Show that  $LM = \frac{1}{2}(BC)$ . [A: L(8,1) ; M(6,3)]
12. A line APB meets the X-axis at A and Y-axis at B. P is the point (-4,2) and AP:PB=1:2. Find the coordinates of A & B. [A: (-6,0) & (0,6)]

Comprehensive study material

13. The line segment joining the points (2,1) and (5,-8) is trisected at the points P & Q. If the point P lies on the line  $2x - y + k = 0$ . Find the value of k. [A: -8]
14. The midpoint of the line segment joining the points (3m,6) and (-4,3n) is (1, 2m-1). Find the values of m & n. [A: m = 2, n = 0]
- \*\*\*\*\*
15. P(3, 4), Q(7, -2) and R(-2, -1) are the vertices of triangle PQR. Write down the equation of its median, through R. [A:  $2x - 7y - 3 = 0$ ]
16. In the fig16, write i) the co-ordinates of A, B and C. ii) the equation of the line through A and parallel to BC. iii) the equation of the line through B and perpendicular to AC. [A: (i) A(2,3) ; B(-1,2) ; C(3,0) (ii)  $x + 2y - 8 = 0$  (iii)  $3y - x - 7 = 0$ ]

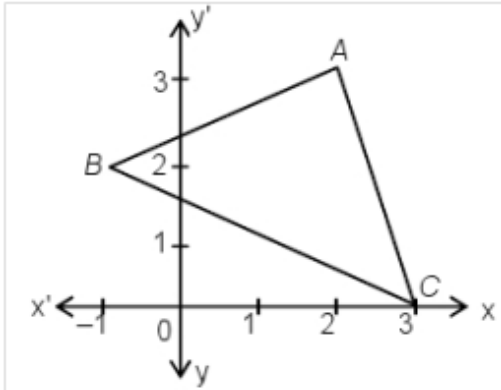
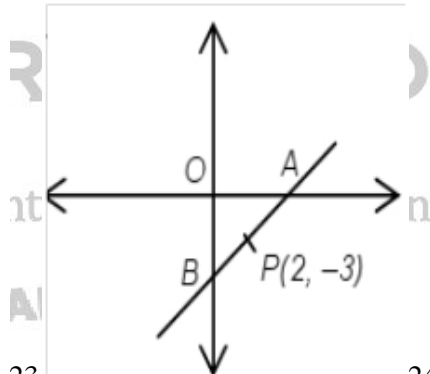
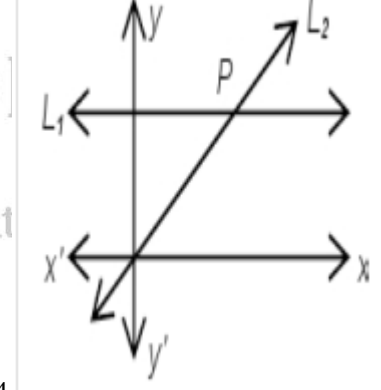


Fig16



23



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17. Find the value of m, if the lines represented by  $2mx - 3y = 1$  and  $y = 1 - 2x$  are perpendicular to each other. [A:  $\frac{3}{4}$ ]
18. Find the equation of the line parallel to the line  $3x + 2y = 8$  and passing through the point (0, 1). [A:  $3x + 2y - 2 = 0$ ]
19. Points A and B have coordinates (7, -3) and (1, 9) respectively. Find i) the slope of AB ii) the equation of the perpendicular bisector of the line segment AB. iii) the value of 'p' if (-2, p) lies on it. [A: -2;  $x - 2y + 2 = 0$ ]
20. Find the equation of a line with x-intercept = 5 and passing through the point (4, -7). [A:  $7x - y - 35 = 0$ ]
21. Find the value of p for which the lines  $2x + 3y - 7 = 0$  and  $4y - px - 12 = 0$  are perpendicular to each other. [A: P=6]
22. The equation of a line is  $3x + 4y - 7 = 0$ . Find i) The slope of the line ii) The equation of a line perpendicular to the given line and passing through the intersection of the lines  $x - y + 2 = 0$  and  $3x + y - 10 = 0$ . [A:  $-\frac{3}{4}$  ;  $4x - 3y + 4 = 0$  ]
23. In the fig23, A and B are two points on the x-axis and y-axis respectively. P(2, -3) is the midpoint of AB. Find the i) Coordinates of A and B ii) Slope of line AB iii) equation of line AB. [A: (i) A(4,0); B(0,-6) (ii)  $\frac{3}{2}$  (iii)  $3x - 2y = 12$ ]
24. In the fig24, given equation of line  $L_1$  is  $y = 4$ . i) Write the slope of line  $L_1$  if  $L_2$  is the bisector of angle O. ii) Write the co-ordinates of point P. iii) Find the equation of  $L_2$ . [A: 1; (4,4);  $x - y = 0$ ]
25. ABCD is a parallelogram where A(x, y), B(5, 8), C(4, 7) and D(2, -4). Find i) Coordinates of A ii) Equation of diagonal BD. [A: (3,-3),  $4x - y - 12 = 0$ ]
26. The line through A(-2,3) and B(4,b) is perpendicular to the line  $2x - 4y = 5$ . Find the value of b. [A: -9]
27. Find the equation of a straight line parallel to the line  $2x + 3y = 5$  and having the same y-intercept as  $x + y + 4 = 0$ . [A:  $2x + 3y + 12 = 0$ ]

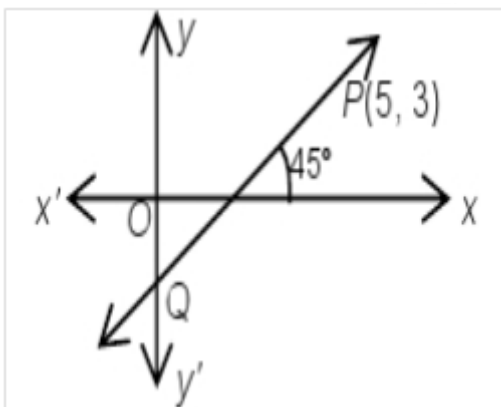
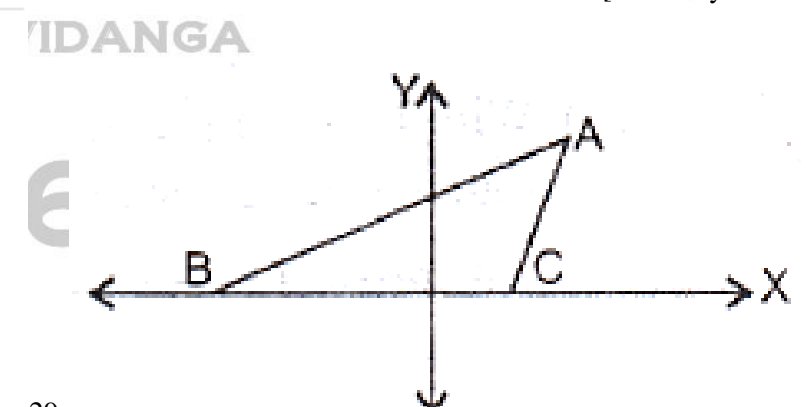


Fig28



29

28. In the fig28, The line through P(5, 3) intersect y-axis at Q. i) Write the slope of the line. ii) Write the equation of the line. iii) Find the co-ordinates of Q. [A: 1;  $x - y - 2 = 0$ ; (0-2)]
29. The fig29, equation of AB is  $x - y + 1 = 0$  and equation of AC is  $\sqrt{3}x - y - 1 = 0$ . Write down the angles which the lines make with the positive direction of x-axis. Hence determine  $\theta$ . [A:  $45^\circ$ ;  $60^\circ$ ;  $15^\circ$ ]
30. Three vertices of a parallelogram ABCD taken in order are A(3, 6), B(5, 10) and C(3, 2) find: i) the coordinates of the fourth vertex D. ii) length of diagonal BD. iii) equation of side AB of the parallelogram ABCD.



Comprehensive study material

31. Find the equations of the diagonals of a rectangle whose sides are  $x=-1$ ,  $x=2$ ,  $y=-2$  and  $y=6$ . [A: (i)  $(1,-2)$  (ii)  $\sqrt{160}$  unit (iii)  $4x-y=6$ ]  
 [A:  $8x-3y+2=0$ ;  $8x+3y-10=0$ ]  
 32. The line joining the points P (4, k) and Q (-3, -4) meets the x-axis at A (1, 0) and y-axis at B. Find (i) the value of k. (ii) the ratio of PB : BQ. [Ans: (i) 3; (ii) 4:3]  
 33. Given that the line  $y/2 = x - p$  and the line  $ax + 5 = 3y$  are parallel, find the value of a. [A: 6]  
 34. If the lines  $3x + y = 4$ ,  $x - ay + 7 = 0$  and  $bx + 2y + 5 = 0$  form three consecutive sides of a rectangle, find the values of a and b. [A:  $a = 3$ ;  $b = 6$ ]  
 35. Find the equation of a straight line perpendicular to the line  $2x + 5y + 7 = 0$  and with y-intercept -3 units. [A:  $5x-2y-6 = 0$ ]

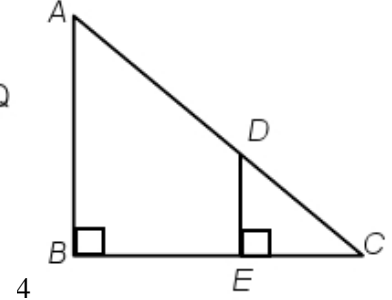
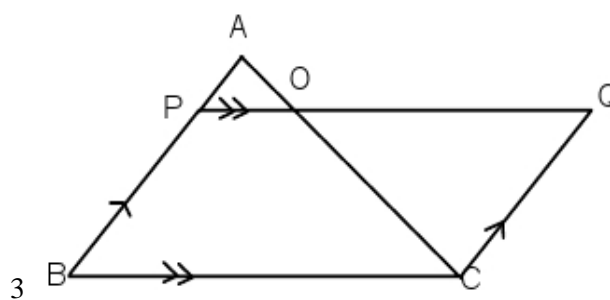
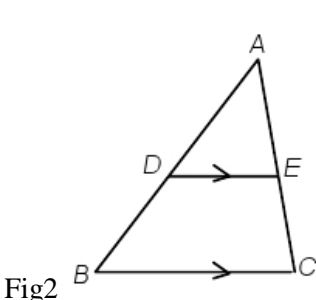
\*\*\*\*\*  
 Use graph for these questions: (Take 10 small divisions = 1 unit on both axes)

36. A(1,1), B(5,1), C(4,2) and D(2,2) are the vertices of a quadrilateral. Plot and name the quadrilateral ABCD. A, B, C and D are reflected in the origin on A', B', C' and D' respectively. Locate A', B', C' and D' on the graph sheet and write their co-ordinates. Are D, A, A', D' collinear? [A: Isosceles trapezium; (-1, -1), (-5, -1), (-4, -2), (-2, -2); co-linear.]  
 37. Plot the points P(3,2) and Q(-3,-2). From P and Q, draw perpendiculars PM and QN on the x-axis. [a] Name the image of P on reflection in the origin. [b] Assign the special name to the geometrical figure PMQN and find its area. [c] Write the co-ordinates of the point to which M is mapped on reflection in i) x-axis ii) y-axis iii) origin. [A: (a) Q (b) 12 sq unit (c) (3,0), (-3,0)]  
 38. Plot the points A(3,2) and B(5,4) on the graph paper. Reflect A and B in the x-axis to A', B'. Write down (i) the geometrical name of the figure ABB'A'. (ii) the axis of symmetry of ABB'A'. (iii) the measure of the angle ABB'. (iv) the image A'' of A, when A is reflected in the origin. (v) the single transformation that maps A' to A. [A: (i) Trapezium (ii) x-axis (iii)  $45^\circ$  (iv) (-3, -2) (v) Reflection in y-axis.]  
 39. Write down the co-ordinates of the image of the point (3, -2) when: (i) reflected in x-axis. (ii) reflected in y-axis (iii) reflected in the x-axis followed by reflection in the y-axis. (iv) reflected in the origin. [A: (i) (3,2) (ii) (-3, -2) (iii) (-3,2) (iv) (-3,2)]  
 40. (i) Point P (a,b) is reflected in the x-axis to P' (5, -2). Write down the values of a, b. (ii) P'' is the image of P when reflected in the y-axis. Write down co-ordinates of P''. (iii) Name the single transformation that maps P' to P''. [A: (i)  $a = 5$ ,  $b = 2$  (ii) (-5,2) (iii) Reflection in the origin.]  
 41. Points A and B have co-ordinates (2,5) and (0,3). Find: (i) The image A' of A under reflection in the x-axis. (ii) the image B' of B under reflection in the line AA'. [A: (i) (2, -5) (ii) (4,3)]  
 42. (i) The point P (2, -4) is reflected about the line  $x=0$  to get the image Q. Find the co-ordinate of Q. (ii) Point Q is reflected about the line  $y=0$  to get the image R. Find the co-ordinate of R. (iii) Name the figure PQR. (iv) Find area of figure PQR. [A: (i) (-2,-4) (ii) (-2,4) (iii) right angled triangle (iv) 16 sq units]  
 43. The point P(3,4) is reflected to P' in the x-axis and O' is the image of O(origin) in the line PP'. Find : (i) the co-ordinates of P' and O'. (ii) the length of segments PP' and OO'. (iii) the perimeter of the quadrilateral POP'O'. [A: (i) (3,-4) (6,0) (ii) 8 units, 6 units (iii) 20 units]  
 44. P and Q have co-ordinates (0,5) and (-2,4). [i] P is invariant when reflected in an axis. Name the axis. [ii] Find the image of Q on reflection in the axis found in (i). [iii] (0,k) on reflection in the origin is invariant. Write the value of k. [iv] Write the co-ordinates of the image of Q, obtained by reflecting it in the origin followed by reflection in x-axis. [A: (i) y-axis (ii) (2,4) (iii)  $k = 0$  (iv) (2,4)]  
 45. (i) Plot the following points A(0,5), B(3,0), C(-1,0) and D(1,-5). (ii) Reflect the points B, C and D on the y axis and name them as B', C' and D' respectively. Locate B', C' and D' on the graph sheet and write their co-ordinates. (iii) Join the points A, B, C, D, D', C', B', A in order and give a name to closed figure. (iv) Write the equation of line C' D. [A: (ii) (-3, 0), (1, 0), (-1, -5), (-2, -2); (iii) Arrow; (iv)  $x = 1$ ]

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**Ch11. Similarity**

1. On a map drawn to a scale of 1:25000, a rectangular plot of land, ABCD has the following measurements  $AB=12\text{cm}$  &  $BC=16\text{cm}$ . Calculate: (i) the distance of a diagonal of plot. (ii) the area of plot in sq.Km. [A: (i) 7.5km (ii) 37.5 km<sup>2</sup>]



Comprehensive study material

- In the fig2,  $DE \parallel BC$ . i) Prove that  $\triangle AED$  and  $\triangle ACB$  are similar. ii) Given that  $AD = \frac{1}{2} BD$ , calculate  $DE$ , if  $BC = 4.5$  cm. iii) also find  $\frac{\text{ar}(\triangle ADE)}{\text{ar}(\triangle ABC)}$  and  $\frac{\text{ar}(\triangle ADE)}{\text{ar}(\text{trapezium } BCED)}$  [A: (ii) 1.5cm]
- In fig3,  $ABC$  is a triangle,  $3AP = 2PB = 2:3$ ,  $PO$  is parallel to  $BC$  and is extended to  $Q$  so that  $CQ$  is parallel to  $BA$ . Find: i) area  $\triangle APO$ : area  $\triangle ABC$  ii) area  $\triangle APO$ : area  $\triangle CQO$  [A: (i) 4:25 (ii) 4:2]
- In the fig4,  $AB$  and  $DE$  are perpendicular to  $BC$ . If  $AB = 9$  cm,  $DE = 3$  cm and  $AC = 24$  cm, calculate  $AD$ . [A: 16cm]

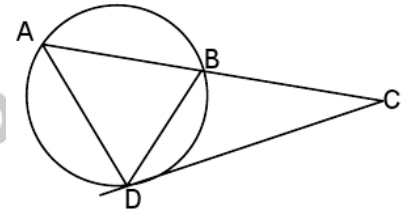
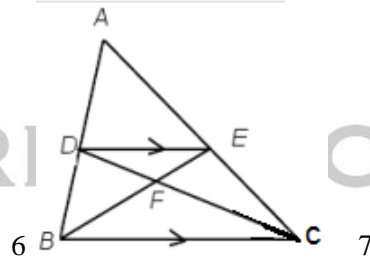
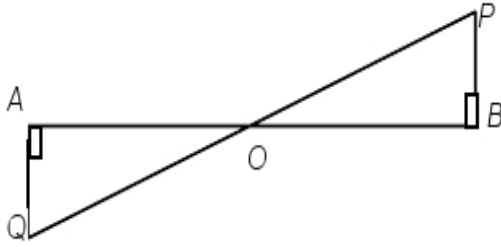


Fig 5

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- In the fig5,  $PB$  and  $QA$  are perpendicular to the line segment  $AB$ . If  $PO = 6$  cm,  $QO = 9$  cm and the area of  $\triangle POB = 120$  cm<sup>2</sup>, find the area of  $\triangle QOA$ . [A: (a) 270 cm<sup>2</sup>]
- In the fig6,  $ABC$  is a triangle.  $DE$  is parallel to  $BC$  and  $\frac{AD}{DB} = \frac{3}{2}$  i) Determine the ratios  $\frac{AD}{AB}$ ,  $\frac{DE}{BC}$  ii) Prove that  $\triangle DEF$  is similar to  $\triangle CBF$ . Hence, find  $\frac{EF}{FB}$  iii) What is the ratio of the areas of  $\triangle DEF$  and  $\triangle BFC$ ? [A: (i)  $\frac{3}{5}, \frac{3}{5}$  (ii)  $\frac{3}{5}$  (iii)  $\frac{9}{25}$ ]
- In the fig7,  $AB = 7$ cm and  $BC = 9$ cm. i) Prove  $\triangle ACD \sim \triangle DCB$  ii) Find the length of  $CD$ . [A: (ii) 12cm]

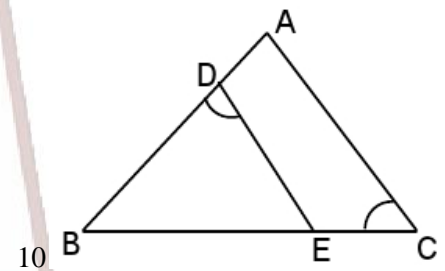
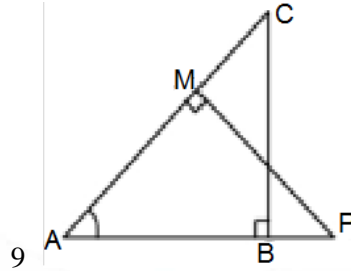
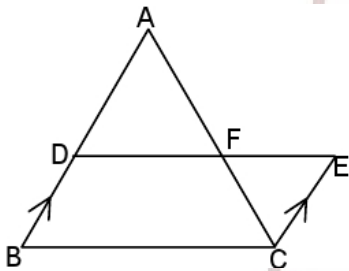


Fig8

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- In the fig8,  $ABC$  and  $CEF$  are two triangles where  $BA$  is parallel to  $CE$  and  $AF : AC = 5 : 8$  i) Prove that  $\triangle ADF \sim \triangle CEF$ . ii) Find  $AD$ , if  $CE = 6$  cm iii) If  $DF$  is parallel to  $BC$  find area of  $\triangle ADF$ : area of  $\triangle ABC$ . [A: (ii) 10cm (iii) 25:64]
- In the fig9,  $\triangle ABC$  and  $\triangle AMP$  are right angled at  $B$  &  $M$  respectively. Given,  $AC=10$ cm,  $AP=15$ cm &  $PM=12$ cm. i) Prove  $\triangle ABC \sim \triangle AMP$  ii) Find  $AB$  and  $BC$ . [A: (ii)  $AB=6$ cm,  $BC=8$ cm]
- In the fig10,  $BC$  is a triangle with  $\angle EDB = \angle ACB$ . Prove that  $\triangle ABC \sim \triangle EBD$ . If  $BE = 6$  cm,  $EC = 4$  cm,  $BD = 5$  cm and area of  $\triangle BED = 9$ cm<sup>2</sup>. Calculate the i) length of  $AB$  ii) area of  $\triangle ABC$ . [A: (i) 12cm (ii) 36 cm<sup>2</sup>]

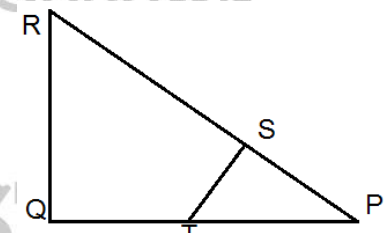
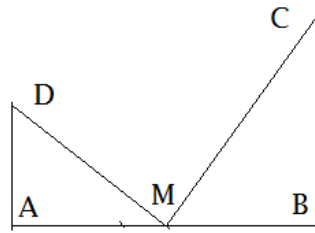
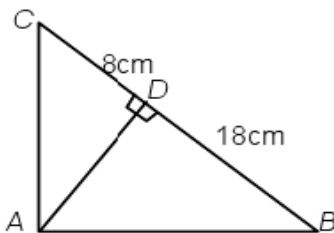


Fig11

12

13

- In the fig11,  $ABC$  is a right Angled triangle with  $\angle BAC = 90^\circ$  i) Prove  $\triangle ADB \sim \triangle CDA$ . ii) If  $BD = 18$  cm,  $CD = 8$  cm find  $AD$ . iii) Find the ratio of the area of  $\triangle ADB$  is to area of  $\triangle CDA$ . [A: (ii) 12cm (iii) 9:4]
- In fig12,  $M$  is midpoint of  $AB$ ,  $\angle A = \angle B = 90^\circ = \angle CMD$ . P.T. (i)  $\triangle DAM \sim \triangle MBC$  (ii)  $\frac{\text{ar}(\triangle DAM)}{\text{ar}(\triangle MBC)} = \frac{AD}{BC}$  (iii)  $\frac{AD}{BC} = \frac{MD^2}{MC^2}$
- In the fig13,  $\angle PQR = \angle PST = 90^\circ$ ,  $PQ = 5$ cm and  $PS = 2$ cm. (i) Prove that  $\triangle PQR \sim \triangle PST$  (ii) Find area of  $\triangle PQR$ : area of quadrilateral  $SRQT$ . [A: (ii) 25:21]
- If  $D$  is a point on  $BC$  such that  $\angle BAD = \angle C$  &  $AB=7$ cm,  $BD=4$ cm. (i) P.T.  $\triangle ABD \sim \triangle CBA$  (ii) Find area of  $\text{ar}(\triangle ABC) : \text{ar}(\triangle ADC)$ . [A: (ii) 49:33]
- In  $\triangle ABC$ ,  $AB=8$ cm,  $AC=10$ cm &  $\angle B=90^\circ$ .  $P$  &  $Q$  are points on the sides  $AB$  &  $AC$  respectively such that  $PQ=2$ cm &  $\angle PQA=90^\circ$ , find: (i)  $\text{ar}(\triangle AQP)$  (ii)  $\text{ar}(PBCQ) : \text{ar}(\triangle ABC)$  [A: (i)  $\frac{8}{3}$  cm<sup>2</sup> (ii) 8:9]

Comprehensive study material

- ABCD is a parallelogram. AM is perpendicular to DC and AN is perpendicular to CB. If AM = 6cm, AN = 10cm, find ratio of area of  $\Delta ANB$  and  $\Delta ADM$  [A: 25:9]
- The model of a building is constructed with scale factor 1 : 30. i) If the height of the model is 80 cm, find the actual height of the building in metres. ii) If the base area of the model is 1000 cm<sup>2</sup>, find the actual base area of the building in metres. iii) If the actual volume of a tank at the top of the building is 27 m<sup>3</sup>, find the volume of the tank on the top of the model. [A: (i) 24m, (ii) 90 m<sup>2</sup> (iii) 1 litre]
- In the fig18, ABCD is a parallelogram. P is a point on BC such that BP: PC=1:2 & DP produced meets AB produced at Q. If ar( $\Delta CPQ$ ) = 20cm<sup>2</sup>, find (i) ar( $\Delta BPQ$ ) (ii) ar( $\Delta CDP$ ) (iii) ar(lgm ABCD). [A: (i) 10cm<sup>2</sup> (ii) 40 cm<sup>2</sup> (iii) 120 cm<sup>2</sup>]

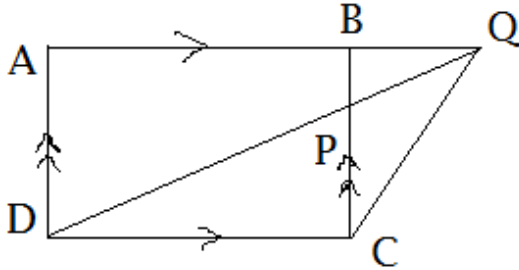
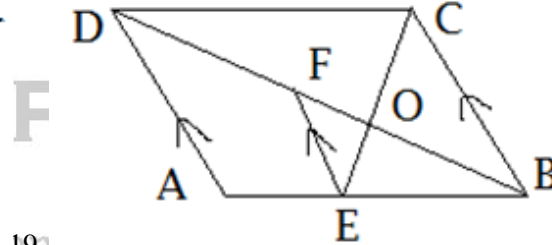
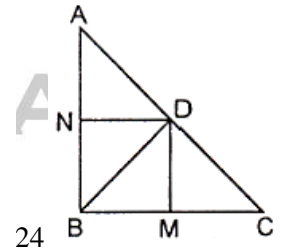


Fig 18



19.



24

- In the fig19, ABCD is a parallelogram. E is a point on AB, CE intersects the diagonal BD at O and EF||BC. If AE:EB=2:3, find (i) EF:AD (ii) area of  $\Delta BEF$  : area of  $\Delta ABD$  (iii) area of  $\Delta ABD$  : area of trap. AEFD (iv) area of  $\Delta FEO$  : area of  $\Delta OBC$ . [A: (i) 3:5 (ii) 9:25 (iii) 25:16 (iv) 9:25]
- In triangle ABC, D is a point on BC such that  $\angle CAD = \angle ABD$ . If AB = 5cm, AC = 3cm, and AD = 4cm, find (i) BC (ii) DC (iii) area of  $\Delta ACD$  : area of  $\Delta BDA$ . [A: (i) 3.75cm (ii) 2.4 cm (iii) 16:9]
- ABCD is a trapezium in which  $AB \parallel DC$  and  $AB = 2CD$ . Determine the ratio of the areas of  $\Delta COD$  and  $\Delta AOB$  [A: 1:4]
- In a trapezium ABCD,  $AB \parallel DC$ , area of  $\Delta AOD = 4$  sq cm and area of  $\Delta BCD = 7$  sq cm. Calculate: (i) area of  $\Delta OCD$  (ii) the ratio BO:OD (iii) area of  $\Delta OAB$  [A: (i) 3 sq cm (ii) 4:3 (iii) 5.33 sq cm.]
- Show that the ratio of the area of two similar triangles is equal to the ratio of the squares of any two corresponding medians.
- In a right triangle ABC,  $\angle ABC = 90^\circ$ , BD, DM and DN are perpendicular on AC, BC and AB respectively. Prove that (i)  $DM^2 = DN \times MC$  (ii)  $DN^2 = DM \times AN$ .
- Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.

**Ch12. Loci**

Using ruler and compasses only. Take 1cm=1unit on both axes:

- Construct a  $\Delta ABC$  with  $BC = 6$  cm,  $\angle ABC = 120^\circ$  and  $AB = 3.5$  cm ii) Draw a circle with BC as diameter. Find a point P on the circumference of the circle which is equidistant from AB and BC. Measure  $\angle BCP$ . [A:  $\angle BCP = 30^\circ$ ]
- Construct a triangle BCP, given  $BC = 5$  cm,  $BP = 4$  cm and  $\angle PBC = 45^\circ$  i) Complete the rectangle ABCD such that: (a) P is equidistant from AB and BC (b) P is equidistant from C and D ii) Measure and record the length of AB. [A: AB=5.7cm]
- A straight line AB is 8 cm long. Locate by construction the locus of a point which is: i) Equidistant from A and B ii) Always 4 cm from the line AB iii) Mark two point X and Y, which are 4 cm from AB and equidistant from A and B. Name the figure AXBY. [A: (iii) Square]
- i) a triangle ABC in which  $AB = 5.5$  cm,  $BC = 3.4$  cm and  $CA = 4.9$  cm ii) the locus of points equidistant from A and C iii) a circle touching AB at A and passing through C.
- i) Construct  $\Delta ABC$ , where  $AB = 3.5$  cm,  $BC = 6$  cm and  $\angle ABC = 60^\circ$  ii) Construct the locus of points inside the triangle which are equidistant from BA and BC. iii) Construct the locus of points inside the triangle which are equidistant from B and C iv) Mark the point P which is equidistant from AB, BC and also equidistant from B and C. Measure and record the length of PB. [A: PB=3.4cm]
- i) Plot the points A(1,1), B(5,3) and C(2,7). ii) Construct the locus of points equidistant from A and B. iii) Construct the locus of points equidistant from AB and AC. iv) Locate the point P such that  $PA = PB$  and P is equidistant from AB and AC. v) Measure and record the length PA in cm. [A: PA=2.5cm]
- Draw a circle of radius 4cm and mark two chords AB and AC of the circle of length 6cm and 5cm respectively. i) Construct the locus of points, inside the circle, that are equidistant from A and C. Prove your construction. ii) Construct the locus of points, inside the circle, that are equidistant from AB and AC. [A: (i) The diameter of the circle which is perpendicular to the chord (ii) The chord of circle bisecting  $\angle BAC$ ]
- Construct a semi-circle with diameter  $BC = 7$ cm. Locate a point A on the circumference of the semicircle such that A is equidistant from B and C. Complete the cyclic quadrilateral ABCD, such that D is equidistant from AB and BC. Measure  $\angle ADC$  and write it down. [A:  $\angle ADC = 135^\circ$ ]



Comprehensive study material

Ch13. Circles

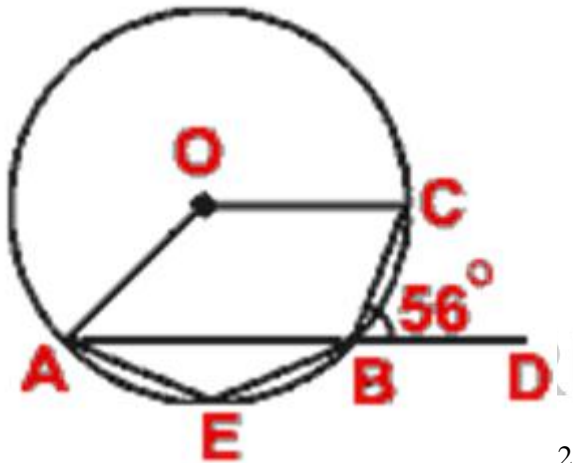
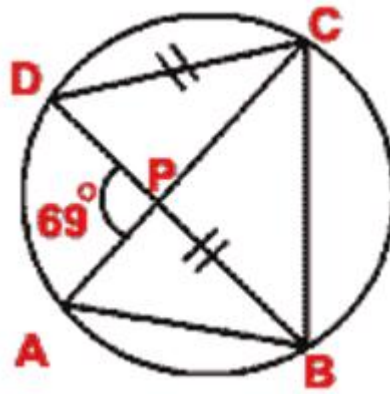
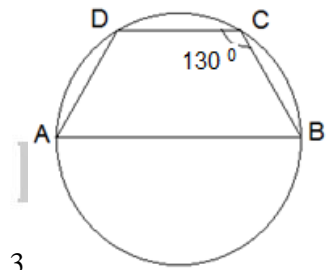


fig1



2



3

- In the fig1, O is the centre of the circle. If  $\angle CBD = 56^\circ$ , find (i)  $\angle AEC$  (ii)  $\angle AOC$ . [A: (i)  $124^\circ$  (ii)  $112^\circ$ ]
- In the fig2, AC is a diameter of the circle. If  $BD = CD$  and  $\angle APD = 69^\circ$ , find  $\angle ACD$ . [A:  $23^\circ$ ]
- In the fig3, AB is the diameter of a circle.  $\angle BCD = 130^\circ$ . Find i)  $\angle DAB$  ii)  $\angle DBA$ . [A:  $50^\circ, 40^\circ$ ]

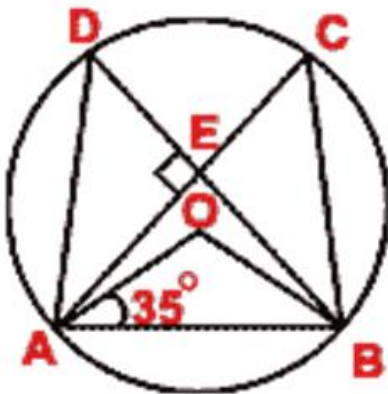
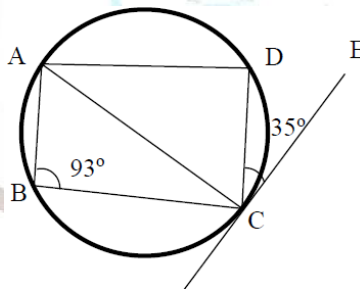
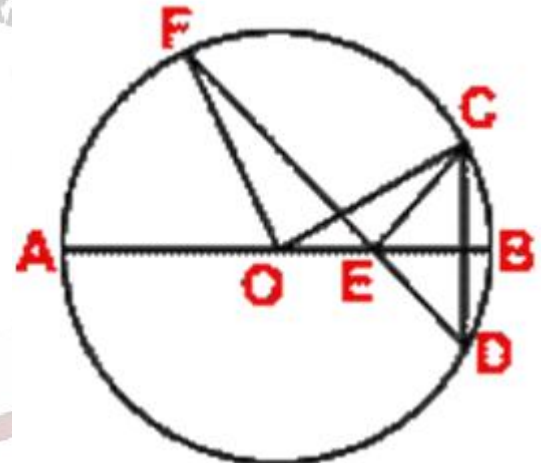


fig4



5



6

- In the fig 4, O is the centre of the circle. If chords AC and BD intersect at right angles at E and  $\angle OAB = 35^\circ$ , calculate  $\angle EBC$ . [A:  $35^\circ$ ]
- In the fig 5, CE is a tangent to the circle at point C. ABCD is a cyclic quadrilateral. If  $\angle ABC = 93^\circ$  and  $\angle DCE = 35^\circ$ . Find: (i)  $\angle ADC$  (ii)  $\angle CAD$  (iii)  $\angle ACD$  [A: (i)  $87^\circ$  (ii)  $35^\circ$  (iii)  $58^\circ$ ]
- In the fig 6, AB is a diameter of the circle whose center is O. Given that  $\angle ECD = \angle EDC = 32^\circ$ , calculate (i)  $\angle CEF$  (ii)  $\angle COF$ . [A:  $64^\circ, 64^\circ$ ]

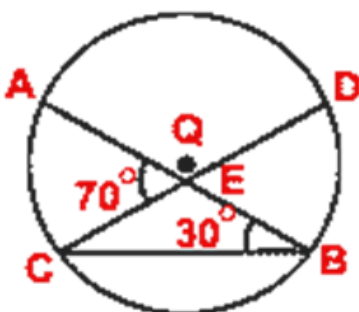
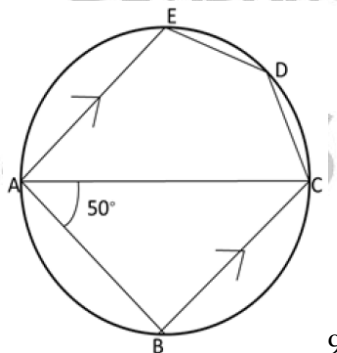
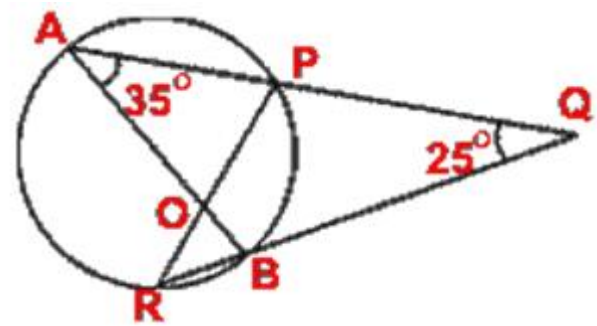


Fig7



8



9

- In the fig 7, Q is the centre of the circle. If  $\angle CBE = 30^\circ$  &  $\angle CEA = 70^\circ$ , find  $\angle BQD$ . [A:  $80^\circ$ ]
- In the fig 8, ABCDE is a pentagon inscribed in a circle such that AC is diameter and side  $BC \parallel AE$ . If  $\angle BAC = 50^\circ$ , find giving reasons: (i)  $\angle ACB$  (ii)  $\angle EDC$  (iii)  $\angle BEC$ , Hence prove that BE is also a diameter. [A:  $40^\circ, 140^\circ, 40^\circ$ ]
- In fig 9, AB is a diameter of the circle APBR. APQ and RBQ are straight lines,  $\angle A = 35^\circ$ ,  $\angle Q = 25^\circ$ . Find (i)  $\angle PRB$  (ii)  $\angle PBR$  (iii)  $\angle BPR$ . [A:  $35^\circ, 115^\circ, 30^\circ$ ]
- In the fig10, O is the center of the circle. If  $\angle COD = 80^\circ$ , find the values of x, y and z. [A:  $40^\circ, 50^\circ, 130^\circ$ ]

Comprehensive study material

11. In the fig 11, AB is parallel to DC,  $\angle BCE = 80^\circ$  and  $\angle BAC = 25^\circ$ . Find:  
 i)  $\angle CAD$  ii)  $\angle CBD$  iii)  $\angle ADC$

[A:  $55^\circ, 55^\circ, 100^\circ$ ]

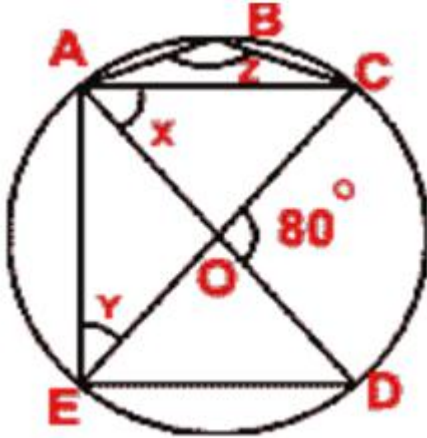
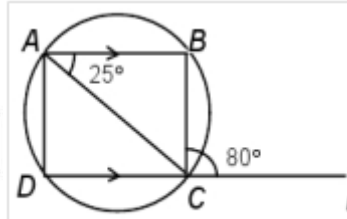
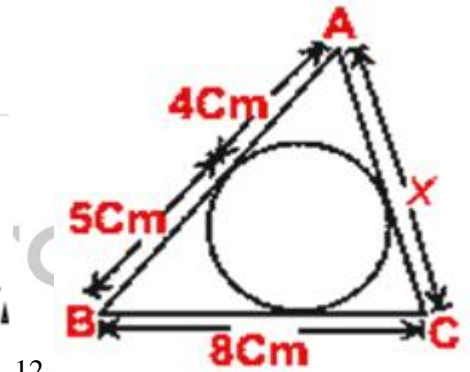


Fig10



11



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12. In the fig 12, triangle ABC is circumscribed, find x.

[A: 7cm]

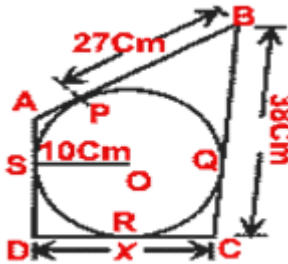
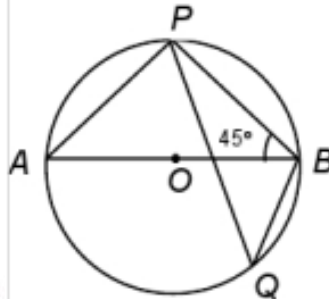
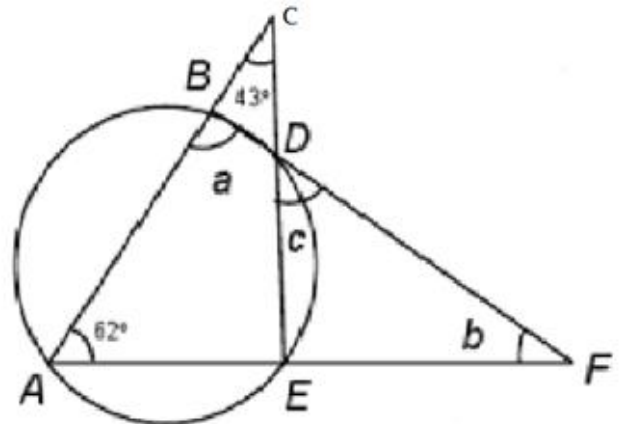


Fig13

15



16



13. In the fig13, quadrilateral ABCD is circumscribed and  $AD \perp DC$ , find x if radius of incircle is 10 cm. [A: 21cm ]  
 14. ABC is a triangle with  $AB = 10$  cm,  $BC = 8$  cm and  $AC = 6$  cm. Three circles are drawn touching each other with the vertices as their centres. Find the radii of the three circles. [A: 4cm, 6cm, 2cm ]  
 15. In the fig 15, O is the centre of the circle and  $\angle PBA = 45^\circ$ . Calculate the value of  $\angle PQB$ . [A:  $45^\circ$ ]  
 16. In the fig 16, if  $\angle ACE = 43^\circ$  and  $\angle CAF = 62^\circ$ . Find the value of a, b and c. [A:  $a = 105^\circ, b = 13^\circ, c = 62^\circ$ ]

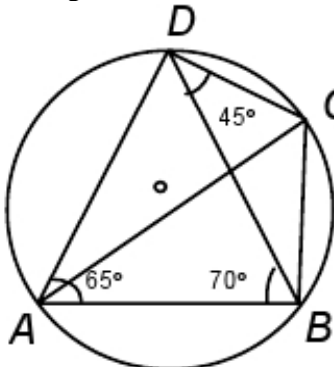
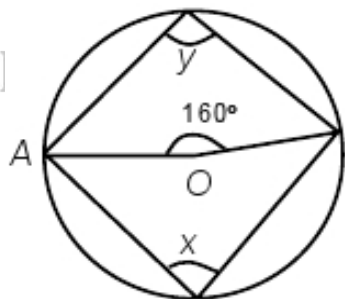
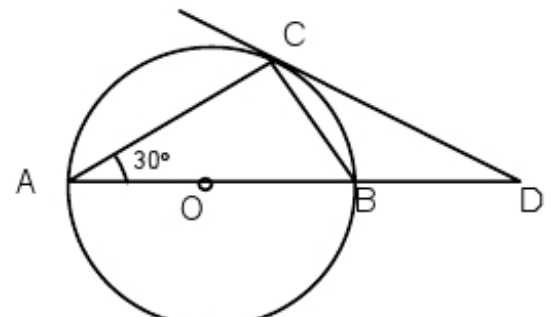


Fig17

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17. In the fig 17,  $\angle BAD = 65^\circ$ ,  $\angle ABD = 70^\circ$  and  $\angle BDC = 45^\circ$ . Find:  
 i)  $\angle BCD$  ii)  $\angle ADB$  Hence show that AC is a diameter. [A: (i)  $115^\circ$  (ii)  $45^\circ$ ]  
 18. In right angle triangle PQR,  $PQ = 24$  cm,  $QR = 7$  cm and  $\angle PQR = 90^\circ$ . Find the radius of the inscribed circle. [A: 3cm]  
 19. A circle with center O, diameter AB and a chord AD is drawn. Another circle is drawn with AO as diameter to cut AD at C. Prove that  $BD = 2OC$ .  
 20. In the fig 20, O is the centre of the circle and  $\angle AOC = 160^\circ$ . Prove that  $3\angle y - 2\angle x = 140^\circ$ .  
 21. In fig 21, AB is a diameter and AC is a chord of a circle such that  $\angle BAC = 30^\circ$ . The tangent at C intersects AB produced at D, Prove that  $BC = BD$ .  
 22. In fig 22, PM is a tangent to the circle and  $PA = AM$ . Prove that: i)  $\triangle PMB$  is isosceles. ii)  $PA \cdot PB = MB^2$ .  
 23. In the given fig 23, given below. O is the centre of the circle and SP is a tangent. If  $\angle SRT = 65^\circ$ , find the value of x, y and z. [A:  $25^\circ, 50^\circ, 40^\circ$ ]

Comprehensive study material

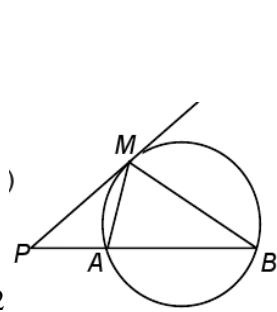
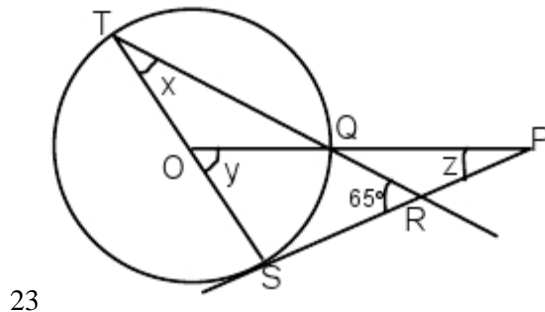
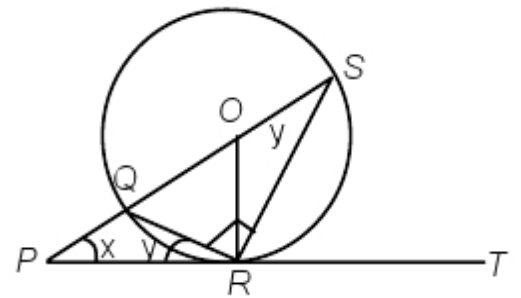


Fig22



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24. In the given fig 24, PT touches a circle with centre O at R. Diameter SQ when produced meets PT at P. If  $\angle SPR = x^\circ$  and  $\angle QRP = y^\circ$ . Show that  $x^\circ + 2y^\circ = 90^\circ$ .

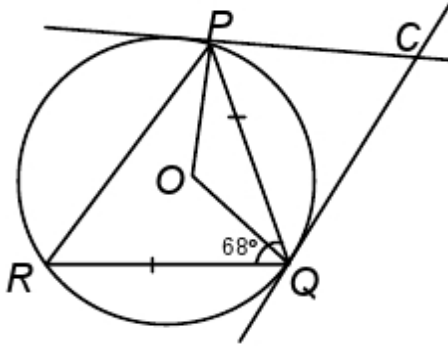
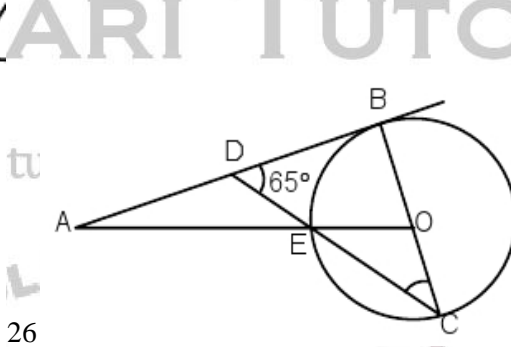
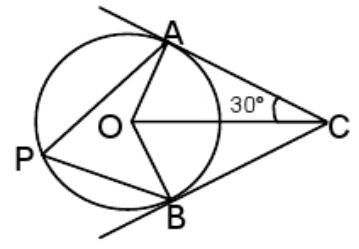


Fig25



26



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25. In the fig 25,  $PQ = QR$ ,  $\angle RQP = 68^\circ$ , PC and CQ are tangents to the circle with centre O. Find  
 i)  $\angle QOP$  ii)  $\angle QCP$ . [A:  $112^\circ, 68^\circ$ ]  
 26. In the fig 26, O is the centre of the circle and AB is a tangent to it at point B.  $\angle BDC = 65^\circ$ . Find  $\angle BAO$ . [A:  $40^\circ$ ]  
 27. In the fig 27, O is the centre of the circle. Tangents at A and B meet at C. If  $\angle ACO = 30^\circ$ , find i)  $\angle BCO$  ii)  $\angle AOB$  iii)  $\angle APB$ . [A: (i)  $30^\circ$  (ii)  $120^\circ$  (iii)  $60^\circ$ ]

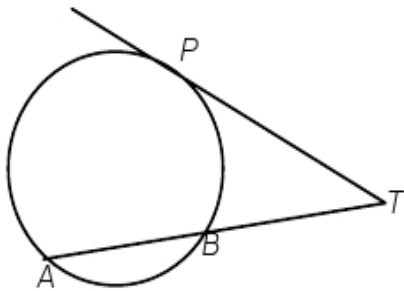
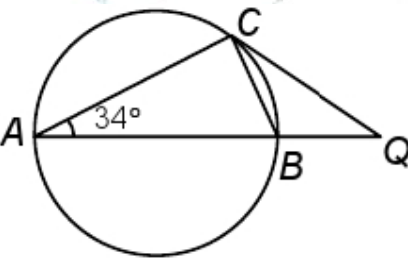
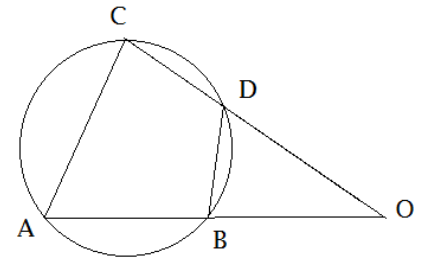


Fig28



29



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28. In the fig 28, PT is a tangent to the circle, Find PT if  $AT = 16$  cm and  $AB = 12$  cm. [A: 8cm]  
 29. In the fig29, AB is a diameter. The tangent at C meets AB produced at Q. If  $\angle CAB = 34^\circ$ , find :  
 i)  $\angle CBA$  ii)  $\angle CQA$  [A:  $56^\circ, 22^\circ$ ]  
 30. In the fig 30, chords AB and CD of the circle are produced to meet at O. Prove that triangles ODB and OAC are similar. Given that  $CD=2$ cm,  $DO=6$ cm and  $BO=3$ cm, calculate AB. Also find the ratio of area of quadrilateral CABD and area of  $\Delta OAC$ . [A: 55:64 ]

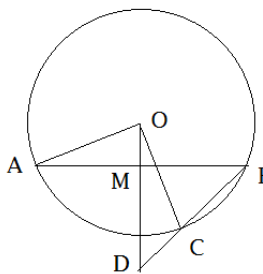
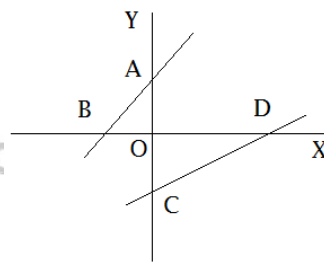
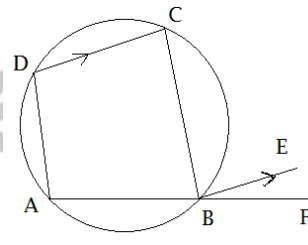


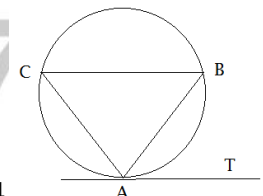
Fig31



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31. In the fig 31, O is centre of the circle,  $OM \perp AB$ . If  $\angle ABC = 42^\circ$ , calculate (i)  $\angle AOC$  (ii)  $\angle ODC$ . Hence prove that ADCO is a cyclic quadrilateral. [A: (i)  $84^\circ$  (ii)  $48^\circ$ ]  
 32. In the fig 32, AB and CD are the lines  $2x - y + 6 = 0$  and  $x - 2y = 4$  respectively, Then prove that (i)  $\Delta OAB \sim \Delta ODC$  (ii) ABCD is a cyclic quadrilateral.  
 33. In the fig 33, ABF is a straight line and  $BE \parallel DC$ . If  $\angle DAB = 92^\circ$  and  $\angle EBF = 20^\circ$ , find (i)  $\angle BCD$  (ii)  $\angle ADC$ . [A: (i)  $88^\circ$  (ii)  $108^\circ$ ]  
 34. In the fig 34, AT is a tangent to a circle at A. If  $\angle CAB = 60^\circ$  and  $\angle TAB = 55^\circ$ , find  $\angle ABC$ . [A:  $55^\circ$ ]



Comprehensive study material

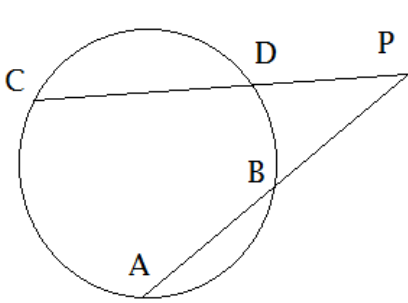
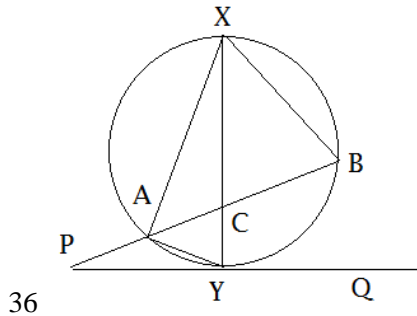
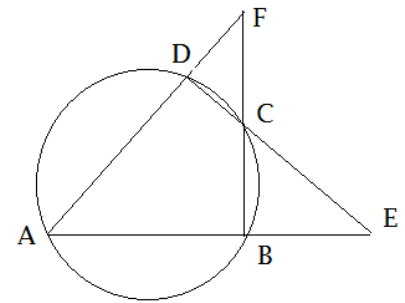


Fig 35



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35. In the fig 35, the lengths of PB, PD and PC are 7cm, 8cm and 17cm respectively, Find AB. [A:  $12\frac{3}{7}$  cm]
36. In the fig 36, XY is a diameter of the circle; PQ is a tangent to the circle at Y. Given that  $\angle AXB = 50^\circ$  and  $\angle ABX = 70^\circ$ , calculate  $\angle BAY$  and  $\angle APY$ . [A:  $30^\circ, 10^\circ$ ]
37. In the fig 37, sides AB and DC of a cyclic quadrilateral ABCD are produced to meet at E, the sides AD and BC are produced to meet at F. If  $\angle BCE : \angle BEC : \angle CFD = 3 : 4 : 5$ , find the values of these angles. [A:  $36^\circ, 48^\circ, 60^\circ$ ]

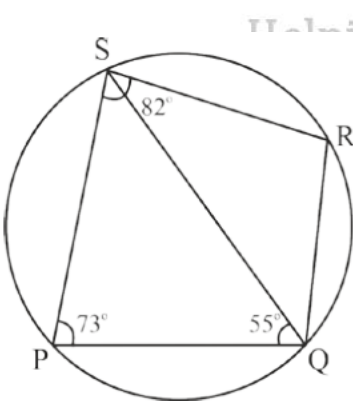
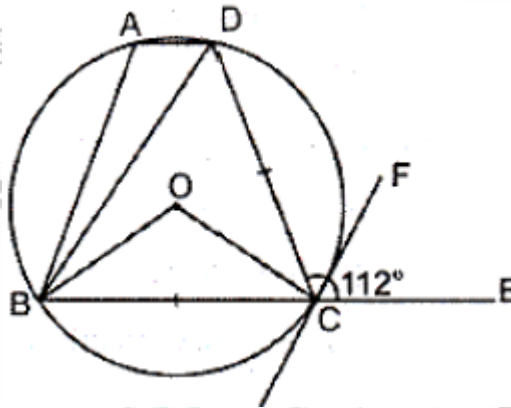
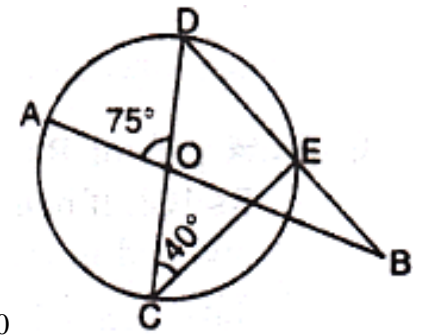


Fig 38



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38. In the fig 38, PQRS is a cyclic quadrilateral. Given  $\angle QPS = 73^\circ$ ,  $\angle PQS = 55^\circ$  and  $\angle PSR = 82^\circ$ , calculate:  
 (i)  $\angle QRS$  (ii)  $\angle RQS$  (iii)  $\angle PRQ$ . [A: (i)  $107^\circ$  (ii)  $43^\circ$  (iii)  $52^\circ$ ]
39. In the figure 39, ABCD is a cyclic quadrilateral in which  $BC = CD$  and CF is a tangent to the circle at C. BC is produced to E and  $\angle DCE = 112^\circ$ . If O is the centre of the circle, find (i)  $\angle BOC$  (ii)  $\angle DCF$ . [A: (i)  $112^\circ$  (ii)  $56^\circ$ ]
40. In the figure, the straight lines AB and CD pass through the centre O of the circle. If  $\angle AOD = 75^\circ$  and  $\angle OCE = 40^\circ$ , find: (i)  $\angle CDE$  (ii)  $\angle OBE$ . [A: (i)  $50^\circ$  (ii)  $25^\circ$ ]

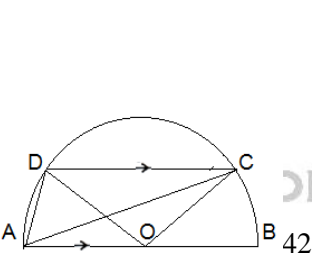
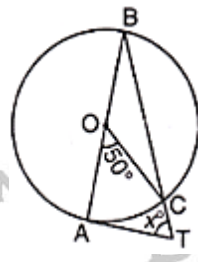
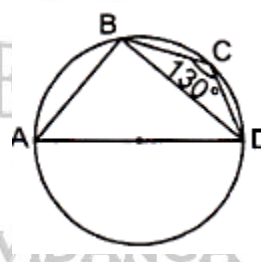


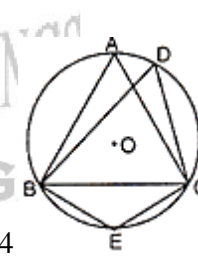
Fig 41



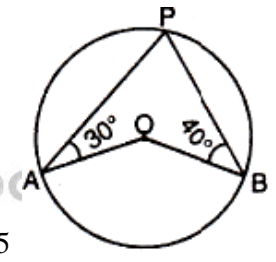
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41. In the fig 41, O is the center of the circle. Chord CD is parallel to the diameter AB. If  $\angle CAO = 25^\circ$ , calculate:  
 (i)  $\angle COB$  (ii)  $\angle DOC$  (iii)  $\angle DAC$  (iv)  $\angle ADC$ . [A: (i)  $50^\circ$  (ii)  $80^\circ$  (iii)  $40^\circ$  (iv)  $115^\circ$ ]
42. In the given fig 42, AB is a diameter of the circle with centre O and  $\angle OAT = 90^\circ$  and C is a point on the circle. Calculate the numerical value of x. [A:  $65^\circ$ ]
43. In the given fig 43, AD is a diameter of the circle  $\angle BCD = 130^\circ$ . Find  $\angle ADB$ . [A:  $40^\circ$ ]
44. In the fig 44, O is the centre of the circle and  $\triangle ABC$  is equilateral. Find: (i)  $\angle BDC$  (ii)  $\angle BEC$ . [A: (i)  $60^\circ$  (ii)  $100^\circ$ ]
45. In the fig 45, O is the centre of the circle. If  $\angle PAO = 30^\circ$  and  $\angle PBO = 40^\circ$ , find:  
 (i)  $\angle APB$  (ii)  $\angle AOB$ . [A: (i)  $70^\circ$  (ii)  $140^\circ$ ]
46. Two chords AB and CD of a circle intersect at P. Prove that  $AP \cdot PB = CP \cdot PD$ . Also find PB, when lengths of PC, PD and PA are 3cm, 4cm and 6cm respectively. [A: 2cm]
47. PA and PB are tangents drawn from an external point P to a circle with centre C. Prove that  $\angle APB = 2\angle CAB$ .
48. PQ is a chord of length 8cm of a circle with centre O and radius 5cm. If the tangents to the circle at the points P and Q intersect at T, find the length TP. [A:  $\frac{20}{3}$  cm]
49. A circle with centre O, diameter AB and a chord AD is drawn. Another circle is drawn with AO as diameter to cut AD at C. Prove that  $BD = 2OC$ .

## Comprehensive study material

## Ch13. Constructions

1. Draw a regular hexagon of side 4cm and construct its (i) incircle (ii) circumcircle.
2. Draw a line  $AB = 6\text{cm}$ . Construct a circle with  $AB$  as diameter. Mark a point  $P$  at a distance of 5cm from the mid-point of  $AB$ . Construct two tangents from  $P$  to the circle. Measure the length of each tangent. [A: 4cm]
3. Construct a triangle  $ABC$  in which base  $BC = 5\text{cm}$ ,  $AB = 6.5\text{cm}$  and  $\angle ABC = 120^\circ$ . (i) Construct a circle circumscribing the triangle  $ABC$ . (ii) Draw a cyclic quadrilateral  $ABCD$  so that  $D$  is equidistant from  $B$  &  $C$ .
4. Draw an equilateral triangle  $ABC$  of side 4cm. In the same diagram, draw a circle which passes through the points  $A$ ,  $B$  and  $C$ , and mark its centre  $O$ .
5. Construct a triangle  $ABC$ , given that  $AB = 4.5\text{cm}$ ,  $BC = 7\text{cm}$  and median  $AD = 4\text{cm}$ . Construct inscribed circle of  $\Delta ABC$

## Ch14. Mensuration

1. A metallic sphere of radius 10.5 cm is melted and then recast into small cones, each of radius 3.5 cm and height 3 cm. Find the number of cones thus obtained. [A: 126]
2. A vessel in the form of an inverted cone is filled with water to the brim. Its height is 20 cm and diameter is 16.8 cm. Two equal solid cones are dropped in it so that they are fully submerged. As a result, one third of the water in the original cone overflows. What is the volume of each of the solid cones submerged? [A: 246.4cm<sup>3</sup>]
3. The surface area of a solid metallic sphere is 616 cm<sup>2</sup>. It is melted and recast into smaller spheres of diameter 3.5 cm. How many such spheres can be obtained? [A: 64]
4. The volume of a conical tent is 1232 m<sup>3</sup> and the area of the bare floor is 154 m<sup>2</sup>. Find the: i) radius of the floor. ii) height of the tent iii) length of the canvas required to cover this tent if its width is 2 m. [A: (i) 7m (ii) 24m (iii) 275m]
5. A hemispherical bowl of diameter 7.2 cm is filled completely with chocolate sauce. This sauce is poured into an inverted cone of radius 4.8 cm. Find the height of the cone. [A: 4.05cm]
6. A solid cone of radius 5 cm and height 8 cm is melted and made into small spheres of radius 0.5 cm. Find the number of spheres formed. [A: 400]
7. A hollow sphere of internal and external radii 6 cm and 8 cm respectively is melted and recast into small cones of base radius 2 cm and height 8 cm. Find the number of cones formed. [A: 37]
8. A hemisphere is surmounted by a conical block of wood. The diameter of their bases is 6 cm each & the slant height of the cone is 5 cm. Find: i) height of the cone ii) volume of solid. [A: 4cm, 94.2cm<sup>3</sup>]
9. The total surface area of a right circular cone of slant height 13 cm is  $90\pi\text{cm}^2$ . Find (i) its radius (ii) its volume (take  $\pi=3.1416$ ). [A: (i) 5cm (ii) 314.6cm<sup>3</sup>]
10. Find the curved surface area of a right circular cylinder of height 13.5 cm. and radius of whose base is 7 cm. [A: 704 cm]
11. The material of a cone is converted into the shape of a cylinder of equal radius. If the height of a cylinder is 5cm, find the height of a cone. [A: 15 cm]
12. A cone, a hemisphere and a cylinder stand on equal bases and have the same heights. Show that their volumes are in the ratio 1:2:3.
13. Volume of two spheres is in the ratio 64:27. Find the ratio of their surface areas. [A: 16 : 9]
14. If the total surface area of a solid right circular cylinder is 880 sq.cm and its radius is 10 cm, find its curved surface area. (Take  $\pi = 22/7$ ). [A:  $251\frac{3}{7}$  sq cm]
15. The ratio between the base radius and the height of a solid right circular cylinder is 2 : 5. If its curved surface area is  $\frac{3960}{7}$  sq.cm, find the height and radius. (Take  $\pi = 22/7$ ). [A: 15cm, 6cm]
16. A heap of rice is in the form of a cone of diameter 9 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap? [A: 74.25cm<sup>3</sup> , 89.1m<sup>2</sup>]
17. A Sphere of diameter 12 cm. is dropped into a cylindrical vessel partly filled with water. The diameter of the vessel is 16cm. if the sphere is completely submerged, then the water level rises by what height. [A: 4.5 cm]
18. A hemispherical bowl of internal radius 9 cm is full of liquid. The liquid is to be filled into cylindrical shaped bottles each of radius 1.5 cm and height 4 cm. How many bottles are needed to empty the bowl? [A: 54]
19. A vessel is in the form of hollow hemisphere mounted by a hollow cylinder .The diameter of hemisphere is 14 cm and total height of vessel is 13 cm. Find the inner surface area of vessel. [A: 572cm<sup>2</sup>]
20. A copper rod of diameter 1 cm and length 8 cm is drawn into a wire of length 18 m of uniform thickness. Find the thickness of wire. [A: 0.67 mm]
21. A hollow metallic cylindrical tube has an internal radius of 3 cm and height 21 cm. The thickness of the metal of the tube is 0.5 cm. The tube is melted and cast into a right circular cone of height 7 cm. Find the radius of the cone correct to one decimal place. [A: 5.4 cm]
22. The diameter of a road roller of length 120 cm is 84 cm. If it takes 500 complete revolutions to level a playground, then find the cost of levelling it at the cost of 75 paise per square metre. (Take  $\pi = 22/7$ ). [A: Rs 1188]

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23. Water in a cylindrical tank of diameter 4 m and height 10 m is released through a cylindrical pipe of diameter 10 cm at the rate of 2.5 Km/hr. How much time will it take to empty the half of the tank? Assume that the tank is full of water to begin with. [A: 3hr 12 min]

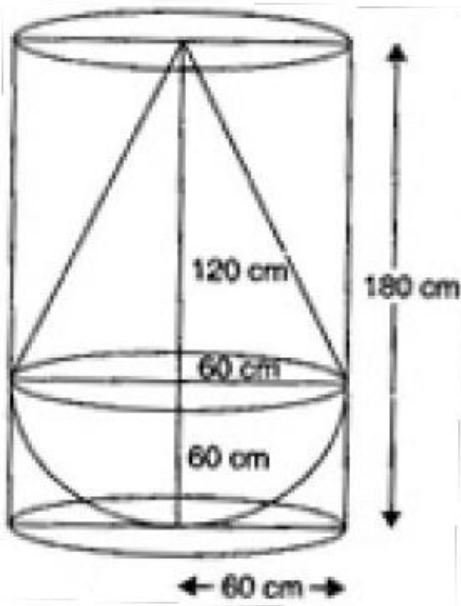
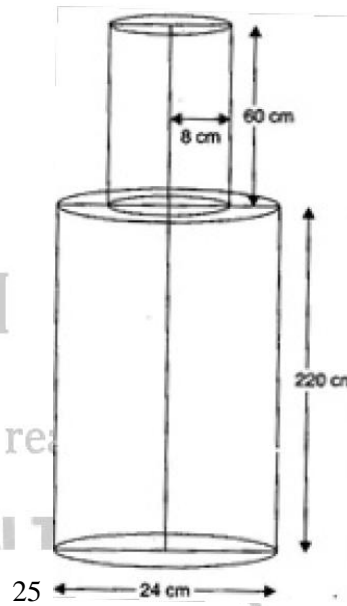
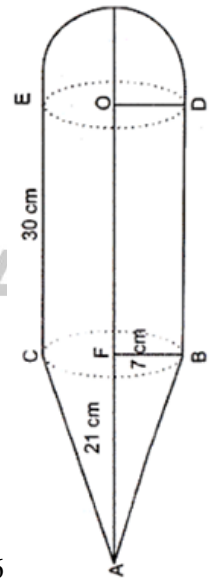


Fig24



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24. A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of water left in the cylinder, if the radius of the cylinder is 60 cm and its height is 180 cm. (Fig 24) [A: 1.131 m<sup>3</sup>]
25. A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm<sup>3</sup> of iron has approximately 8 g mass. (fig 25) [A: 111532.8 cm<sup>3</sup>]
26. Find the volume of the solid (figure 26). [A: 5702.66 cm<sup>3</sup>]

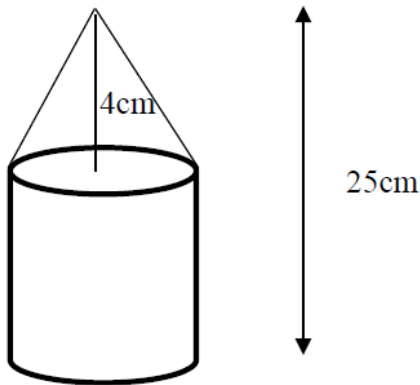
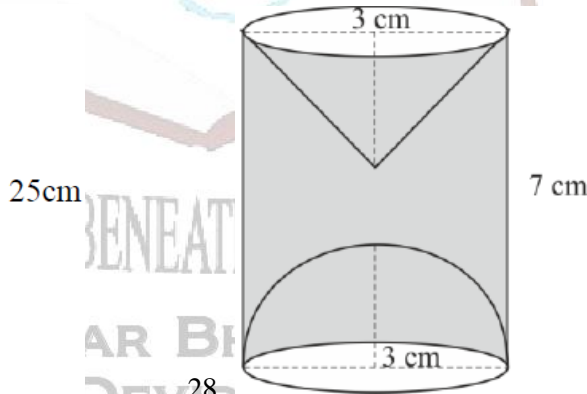
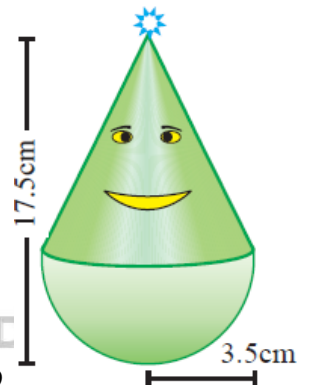


Fig 27



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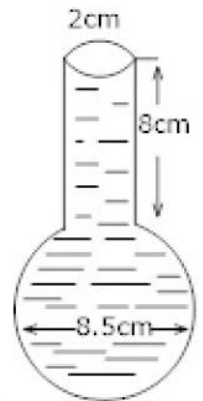
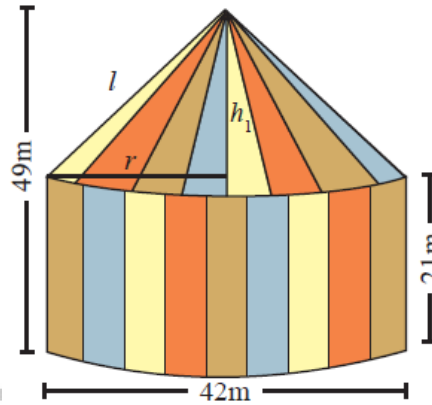
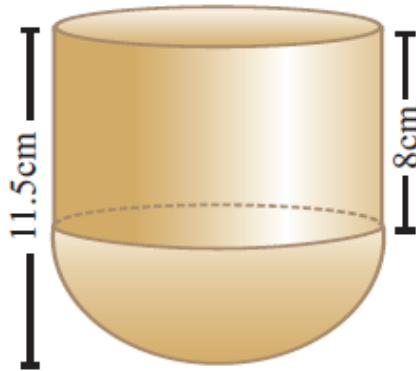


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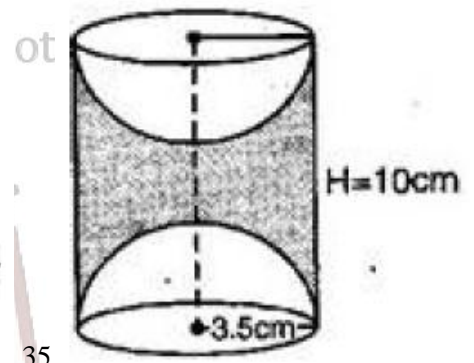
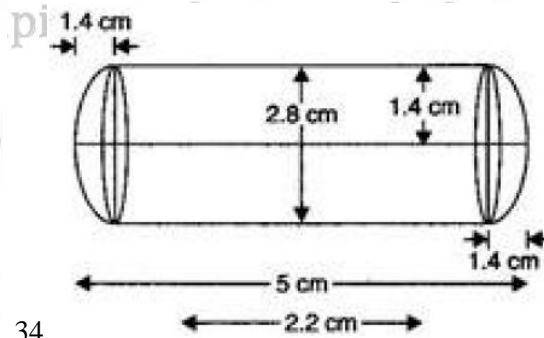
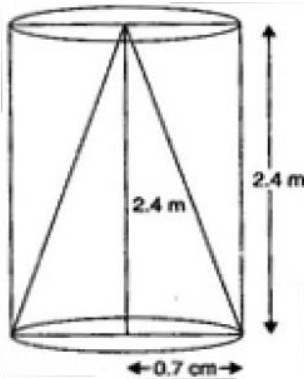
27. In the given figure 27, a solid cylinder is surmounted by a cone. The diameter of the base of the cylinder is 6 cm. The height of the cone is 4 cm and the total height of the solid is 25 cm. Take  $\pi = 22/7$ . Find the:  
 (i) Volume of the solid (ii) Curved surface area of the solid. Give your answers correct to the nearest whole number. [A: (i) 631.71cm<sup>3</sup> (ii)122.57cm<sup>2</sup> ]
28. In the given figure 28, a hemispherical and a conical hole is scooped out of a solid wooden cylinder. Find the volume of the remaining solid where the measurements are as follows:  
 The height of the solid cylinder is 7 cm, radius of each of hemisphere, cone and cylinder is 3 cm. Height of cone is 3 cm. Give your answer correct to the nearest whole number. Take  $\pi = 22/7$  [A: 113 cm<sup>3</sup>]
29. In the given figure 29, a solid wooden toy is in the form of a cone surmounted on a hemisphere. If the radii of the hemisphere and the base of the cone are 3.5 cm each and the total height of the toy is 17.5 cm, then find the volume of wood used in the toy. ( Take  $\pi = 22/7$  ). [A: 269.5 cm<sup>3</sup>]
30. A cup is in the form of a hemisphere surmounted by a cylinder. The height of the cylindrical portion is 8 cm and the total height of the cup is 11.5 cm. Find the total surface area of the cup. ( Take  $\pi = 22/7$  ). (fig 30) [A: 253 cm<sup>2</sup>]
31. A circus tent is to be erected in the form of a cone surmounted on a cylinder. The total height of the tent is 49 m. Diameter of the base is 42 m and height of the cylinder is 21 m. Find the cost of canvas needed to make the tent, if the cost of canvas is ₹12.50/m<sup>2</sup> . ( Take  $\pi = 22/7$  ). (fig 31) [A: ₹63525]



Comprehensive study material



- Fig 30
32. A spherical glass vessel has a cylindrical neck 8 cm long, 2 cm in diameter, the diameter of the spherical part 8.5 cm. Find the amount of water it can hold. ( Take  $\pi = 22/7$  ). (fig 32) [A: 346.51 cm<sup>3</sup>]



33. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm<sup>2</sup>. (fig 33) [A: 18 cm<sup>2</sup>]
34. A gulabjamun, contains sugar syrup up to about 30% of its volume. Find approximately how much syrup would be found in 45 gulab jamuns, each shaped like a cylinder with two hemispherical ends, with length 5 cm and diameter 2.8 cm (see figure 34). [A: 338 cm<sup>3</sup>]
35. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder as shown in figure. If the height of the cylinder is 10 cm and its base is of radius 3.5 cm, find the total surface area of the article. (fig 35) [A: 374 cm<sup>2</sup>]

**Ch15.Trigonometry**

1. Prove the following identities:

(i)  $\tan^2\theta - \frac{1}{\cos^2\theta} + 1 = 0$

(ii)  $\frac{1}{\sin\theta + \cos\theta} + \frac{1}{\sin\theta - \cos\theta} = \frac{2\sin\theta}{1 - 2\cos^2\theta}$

(iii)  $\cot^2 A - \cos^2 A = \cot^2 A \cos^2 A$

(iv)  $1 + \frac{\tan^2 A}{1 + \sec A} = \sec A$

(v)  $(1 + \tan^2 A)(1 - \sin A)(1 + \sin A) = 1$

(vi)  $\frac{\sin A}{1 - \cos A} = \operatorname{cosec} A + \cot A$

(vii)  $\sqrt{\frac{1 - \cos A}{1 + \cos A}} = \frac{\sin A}{1 + \cos A}$

(viii)  $\sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} = \sec\theta + \tan\theta$

(ix)  $\frac{1 - \cos\theta}{1 + \cos\theta} = (\operatorname{cosec}\theta - \cot\theta)^2$

(x)  $\frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} = 2 \operatorname{cosec} A$

(xi)  $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$

(xii)  $\frac{\sin A - \sin B}{\cos A + \cos B} + \frac{\cos A - \cos B}{\sin A - \sin B} = 0$

(xiii)  $\frac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} = 2 + \frac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta}$

(xiv)  $\frac{\tan\theta - \sin\theta}{\cos A \cot A} = \frac{\sec\theta - 1}{\sec\theta + 1}$

(xv)  $\frac{\cot A + \tan B}{\cot B + \tan A} = \cot A \tan B$

(xvi)  $\frac{1 - \sin A}{1 - \cos A} = 1 + \operatorname{cosec} A$

(xvii)  $\frac{1}{\sec A + \tan A} - \frac{1}{\cos A} = \frac{1}{\cos A} - \frac{1}{\sec A - \tan A}$

(xviii)  $\frac{\sin A \tan A}{1 - \cos A} = 1 + \sec A$

(xix)  $\frac{\operatorname{cosec} A}{\operatorname{cosec} A - 1} + \frac{\operatorname{cosec} A}{\operatorname{cosec} A + 1} = 2 \sec^2 A$

(xx)  $\frac{\tan A}{\sec A - 1} + \frac{\tan A}{\sec A + 1} = 2 \operatorname{cosec} A$

## Comprehensive study material

(xxi)  $\frac{1+\sin A}{\cos A} + \frac{\cos A}{1+\sin A} = 2\sec A$

(xxiii)  $\sin A \cot A + \sin A \operatorname{cosec} A = 1 + \cos A$

(xxv)  $\sin^4 \theta + \cos^4 \theta + 2\sin^2 \theta \cos^2 \theta = 1$

(xxvii)  $\sec A(1-\sin A)(\sec A + \tan A) = 1$

(xxix)  $\frac{\cot A - 1}{2 - \sec^2 A} = \frac{\cot A}{1 + \tan A}$

(xxxix)  $\frac{1 - \tan^2 A}{\cot^2 A - 1} = \tan^2 A$

(xxxiii)  $\frac{\sec A - 1}{\sec A + 1} = \frac{1 - \cos A}{1 + \cos A}$

(xxxv)  $(1 + \tan A)^2 + (1 - \tan A)^2 = 2\sec^2 A$

(xxxvii)  $\tan^2 A - \sin^2 A = \tan^2 A \sin^2 A$

(xxxix)  $\cot A - \tan A = \frac{2\cos^2 A - 1}{\sin A \cos A}$

(xxii)  $1 - \frac{\cos^2 A}{1 + \sin A} = \sin A$

(xxiv)  $\frac{1}{1 + \tan^2 \theta} + \frac{1}{1 + \cot^2 \theta} = 1$

(xxvi)  $\cot^2 A - \frac{1}{\sin^2 A} + 1 = 0$

(xxviii)  $\frac{1}{1 + \cos A} + \frac{1}{1 - \cos A} = 2\operatorname{cosec}^2 A$

(xxx)  $\frac{\sin A}{1 + \cos A} = \frac{1 - \cos A}{\sin A}$

(xxxii)  $\frac{\sin A}{1 + \cos A} = \operatorname{cosec} A - \cot A$

(xxxiv)  $\frac{\tan^2 A}{(\sec A - 1)^2} = \frac{1 + \cos A}{1 - \cos A}$

(xxxvi)  $\sec^2 A + \operatorname{cosec}^2 A = \sec^2 A \operatorname{cosec}^2 A$

(xxxviii)  $\frac{\cos A}{1 - \tan A} - \frac{\sin^2 A}{\sin A - \cos A} = \cos A + \sin A$

(xl)  $\frac{\sec A}{\sec A - 1} + \frac{\sec A}{\sec A + 1} = 2\operatorname{cosec}^2 A$

2. Show that :

(i)  $\sin A (1 + \tan A) + \cos A (1 + \cot A) = \sec A + \operatorname{cosec} A$

(ii)  $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = \tan^2 A + \cot^2 A + 7$

(iii)  $(\sin A + \cos A)(\sec A + \operatorname{cosec} A) = 2 + \sec A \operatorname{cosec} A$

(iv)  $(\operatorname{cosec} A - \sin A)(\sec A - \cos A)\sec^2 A = \tan A$

(v)  $(\operatorname{cosec} A - \sin A)(\sec A - \cos A)(\tan A + \cot A) = 1$

(vi)  $(\sin A + \cos A)(\tan A + \cot A) = \sec A + \operatorname{cosec} A$

(vii)  $(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0$

(viii)  $\frac{\cos^2 \theta}{1 - \tan \theta} + \frac{\sin^3 \theta}{\sin \theta - \cos \theta} = 1 + \sin \theta \cos \theta$

(ix)  $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$

(x)  $\frac{1 + \sec \theta - \tan \theta}{1 + \sec \theta + \tan \theta} = \frac{1 - \sin \theta}{\cos \theta}$

(xi)  $\sqrt{\frac{1 + \cos \theta}{1 - \cos \theta}} + \sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = 2\operatorname{cosec} \theta$

(xii)  $\sqrt{\sec^2 \theta + \operatorname{cosec}^2 \theta} = \tan \theta + \cot \theta$

3. If  $\sec \theta + \tan \theta = p$ , prove that  $\sin \theta = \frac{p^2 - 1}{p^2 + 1}$ 4. Given that  $\sin \theta + 2\cos \theta = 1$ , then prove that  $2\sin \theta - \cos \theta = 2$ .5. If  $\tan \theta + \sec \theta = 1$ , then prove that  $\sec \theta = \frac{1^2 + 1}{2 \cdot 1}$ 6. If  $\sin \theta + \cos \theta = p$  and  $\sec \theta + \operatorname{cosec} \theta = q$ , then prove that  $q(p^2 - 1) = 2p$ .7. If  $a \sin \theta + b \cos \theta = c$ , then prove that  $a \cos \theta - b \sin \theta = \sqrt{a^2 + b^2 - c^2}$ .8. From the top of a cliff 92 m high, the angle of depression of a buoy is  $20^\circ$ . Calculate to the nearest meter, the distance of the buoy from the foot of the cliff. [A: 253m]9. A river is 60m wide. A tree of unknown height is on one bank. The angle of elevation of the top of the tree from the point exactly opposite to the foot of the tree, on the other bank, is  $30^\circ$ . Find the height of the tree. [A: 34.64m]10. A vertical pole and a vertical tower are on the same level ground. From the top of the pole the angle of elevation of the top of the tower is  $60^\circ$  and the angle of depression of the foot of the tower is  $30^\circ$ . Find the height of the tower if the height of the pole is 20 m. [A: 80m]11. From the top of building 20m high, the angle of elevation of the top of a monument is  $45^\circ$  and the angle of depression of its foot is  $15^\circ$ . Find the height of the monument. [A: 94.64m]12. The horizontal distance between two towers is 140 m. The angle of elevation of the top of the first tower, when seen from the top of the second tower is  $30^\circ$ . If the height of the second tower is 60m, find the height of the first tower. [A: 140.83m]

## Comprehensive study material

13. The angle of depression of the top and the bottom of an 8m tall building from the top of multi-storied building are  $30^\circ$  and  $45^\circ$  respectively. Find the height of the multi-storied building and the distance between the two buildings, correct to two decimal places. [A: 18.93m,18.93m]
14. From the top of a cliff 90 m high, the angles of depression of the top and bottom of a tower are observed to be  $30^\circ$  and  $60^\circ$  respectively. Find the height of the tower. [A: 60m]
15. A pole of height 5m is fixed on the top of a tower. The angle of elevation of the top of the pole is observed from a point A on the ground is  $60^\circ$  and the angle of depression of the point A from the top of the tower is  $45^\circ$ . Find the height of the tower. [A: 6.83m ]
16. A man 1.8m high stands at a distance of 3.6m from a lamp post and casts a shadow of 5.4m on the ground. Find the height of the lamp post. [A: 3m ]
17. From the top of a light house 100 m high the angles of depression of two ships on opposite sides of it are  $48^\circ$  and  $36^\circ$  respectively. Find the distance between the two ships to the nearest metre. [A: 228m]
18. The shadow of a vertical tower on a level ground increases by 10 m when the altitude of the sun changes from  $45^\circ$  to  $30^\circ$ . Find the height of the tower, correct to two decimal places. [A: 13.66m]
19. From two points A and B on the same side of a building, the angles of elevation of the top of the building are  $30^\circ$  and  $60^\circ$  respectively. If the height of the building is 10 m, find the distance between A and B correct to two significant figures. [A:12m ]
20. Two people standing on the same side of a tower in a straight line with it, measure the angles of elevation of the top of the tower at  $25^\circ$  and  $50^\circ$  respectively. If the height of the tower is 70 m find the distance between the two people. [A: 91.4m ]
21. From the top of a hill, The angles of depression of two consecutive kilometer stones due east are found to be  $30^\circ$  and  $45^\circ$ , find the height of the hill in km correct to two places of decimal. [A:137km ]
22. A man observes the angle of elevation of the top of a building to be  $30^\circ$ . He walks towards it in a horizontal line through its base. On covering 60 m the angle of elevation changes to  $60^\circ$ . Find the height of the building correct to the nearest meter. [A: 52m ]
23. As observed from the top of a 80 m tall lighthouse, the angles of depression of two ships on the same side of the light house in horizontal line with its base are  $30^\circ$  and  $40^\circ$  respectively. Find the distance between the two ships. Give your answer correct to the nearest meter. [A: 43m ]
24. From the top of a cliff 150m high, the angles of depression of two boats are  $60^\circ$  and  $30^\circ$ . Find the distance between the boats, if the boats are (i) on the same side of the cliff (ii) On the opposite sides of the cliff. [A:173.2m; 346.4m ]
25. From a boat 300 meters away from a vertical cliff, the angles of elevation of the top and the foot of a vertical concrete pillar at the edge of the cliff are  $55^\circ 40'$  and  $54^\circ 20'$  respectively. Find the height of the pillar correct to the nearest meter. [A: 21m]
26. The angle of elevation of the top of an unfinished tower at a point distant 120m from its base is  $45^\circ$ . How much higher the tower must be raised so that its angle of elevation at the same point may be  $60^\circ$ . [A: 87.84m]
27. Two poles AB and PQ are standing opposite each other on either side of a road 200m wide. From a point R between them on the road, the angles of elevation of the top of the poles AB and PQ are  $45^\circ$  and  $40^\circ$  respectively. If height of AB = 80m, find the height of PQ correct to the nearest meter. [A:101m]

## Ch16. Statistics

1. The marks obtained by 12 students in a class test are 14, 13, 09, 19, 05, 08, 16, 17, 11, 10, 12, 16. Find (i) the mean of their marks. (ii) the mean of their marks when the marks of each student are increased by 3. (iii) the mean of their marks when the marks of each student are doubled. [A: (i) 12.5 (ii) 15.5 (iii) 25]
2. The mean of the numbers 6, x, 7, 14,  $3x + 3$  is 10, find the value of x. [A: 5 ]
3. Find the mean of 25 given numbers when the mean of 10 of them is 13 and the mean of the remaining numbers is 18. [A:16 ]
4. If 3, 8, 10, x, 14, 16, 18, 20 are in ascending order and their median is 13, find the value of x. [A: 12 ]
5. A boy scored the following marks in various class tests during a term, each test being marked out of 20: 15,17,16,7,10,12,14,16,19,12,16. What are his (i) modal marks? (ii) median marks? [A: (i) 16 (ii) 15]
6. The marks obtained by 16 students in a class test are: 3, 6, 8, 13, 15, 5, 23, 21, 9, 10, 17, 20, 1, 18, 12, 21 Find: (i) the median (ii) lower quartile (iii) upper quartile. [A: (i) 12.5 (ii) 6 (iii) 18 ]
7. The numbers 6, 8, 10, 12, 13, and x are arranged in an ascending order. If the mean of the observations is equal to the median, find the value of x. [A:17 ]
8. If 3,8,10,x,14,16,18,20 are in ascending order and their median is 13, calculate the numerical value of x. [A: 12 ]
9. The mean of the numbers 1,7,5,3,4,4 is m. The numbers 3,2,4,2,3,3,p have mean (m-1) and median q. Find the mean of p and q. [A: 3.5 ]
10. The median of the following observations 11, 12, 14, (x-2), (x+4), (x+9), 32, 38, 47 arranged in ascending order is 24. Find the mean. [A: 25 ]
11. The mean of 5 numbers is 18. If one of the numbers is excluded, their mean is 16. Find the correct mean. [A: 26 ]



## Comprehensive study material

12. A cricketer has mean score of 58 runs in nine innings Find out how many runs are to be scored in the tenth inning to raise the mean score to 61. [A: 88 run ]
13. The mean of 20 numbers is 18. If 3 are added to each of first ten numbers, find the mean of the new set of 20 numbers. [A: 19.5 ]
14. The average height of 30 students is 150 cm. It was detected later that one value of 165 cm was wrongly copied as 135 cm for the computation of mean. Find the correct mean. [A: 151cm]
15. The mean weight of 60 students of a class is 52.75 kg. If the mean weight of 25 students of this class is 51 kg, find the mean weight of remaining 35 students of the class. [A: 54kg]
16. There are 120 students in a class in which 20 of them are girls and the rest boys. If the average mark in mathematics of the boys is 65% and that of girls is 80%, find average marks of the class. [A: 67.5%]
17. Two groups of 30 and 50 items have average score 120 and 80 respectively. When a group of 40 items is added to these two groups, the combined average score of 120 items is 90. Find the average score of the new group of 40 items. [A: 80]
18. The mean of 20 observations was 60. It was detected on rechecking that the value of 125 was wrongly copied as 25 for computation of mean. Find the correct mean. [A: 65]

19. Six coins were tossed 1000 times, and at each toss the number of heads were counted and the results were recorded as

No. Of heads	6	5	4	3	2	1	0
No. Of tosses	20	25	160	283	338	140	34

Calculate the mean for this distribution.

[A:2.55]

20. Find the mean of the following distribution: [A: 49.6]

Class interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

21. Find the value of the missing variate for the following distribution whose mean is 10: [A: 13]

Variate ( $x_i$ )	5	7	9	11	--	15	20
Frequency ( $f_i$ )	4	4	4	7	3	2	1

22. If mean of the following data is 9, Find the value of K. [A: 5]

x	3	6	12	15	9
y	4	K	1	6	4

23. Find x if mean of the following data is 62.8 [A: 10]

Class interval	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	5	8	x	12	7	8

24. If the mean of the following distribution is 6, find the value of p. [A: 7]

x	2	4	6	10	P+5
f	3	2	3	1	2

25. The following distribution shows the daily pocket allowance of children of a locality. The mean pocket allowance is Rs 18. Find the value of f: [A: 8]

Daily allowance (in Rs)	11-13	13-15	15-17	17-19	19-21	21-23	23-25
No. Of children	3	6	9	13	f	5	4

26. The mean of the following distribution is 50 and the sum of all the frequencies is 120. Find the values of p and q. [A: p =28, q = 24]

Class mark	10	30	50	70	90
Frequency	17	p	32	q	19

27. By all three methods, find the mean of the marks obtained by the students. [A:62 ]

Marks obtained	10-25	25-40	40-55	55-70	70-85	85-100
Number of student	2	3	7	6	6	6

28. Find  $f_1$  and  $f_2$  if the mean of the following frequency distribution is 50 and the sum of all the frequencies is 120. [A: 28, 24]

Class	0-20	20-40	40-60	60-80	80-100
Frequency	17	$f_1$	32	$f_2$	19

29. Find the mean marks of students for the following distribution. [A: 51.75]

Marks	0 and above	10and above	20and above	30and above	40and above	50and above	60and above	70and above	80and above	90and above	100and above
No. of students	80	77	72	65	55	43	28	16	10	8	0

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30. Determine the mean of the following distribution. [A: 48.41]

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60	Below 70	Below 80	Below 90	Below 100
No. of students	5	9	17	29	45	60	70	78	83	85

31. Find the unknown entries a, b, c, d, e, f in the following distribution of heights of students in a class. [A: a = 12, b = 13, c = 35, d = 8, e = 5, f = 50.]

Height (in cm)	150-155	155-160	160-165	165-170	170-175	175-180	Total
Frequency	12	b	10	d	e	2	50
Cumulative frequency	a	25	c	43	48	f	

32. The daily wages of 160 workers in a building project are given bellow:

Wages (in Rs)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of workers	12	20	30	38	24	16	12	8

Draw an ogive and from it determine : (i) the median wage (ii) upper quartile wage, (iii) lower quartile wage (iv) the percentage of workers whose earning is less than Rs 45 a day. [A: (i) Rs 34.50 (ii) Rs 48 (iii) Rs 23.50 (iv) 70%]

33. Draw an ogive for following distribution which shows a record of weight in kilograms of 200 students

Weight (kg)	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80
Frequency	5	17	22	45	51	31	20	9

Estimate: (i) The percentage of students weighting 55kg or more. (ii) The weight above which the heaviest 30% of students fall. (iii) The number of students who are over – weight, if 55.70 kg is considered as standard weight.

[A: (i) 78% (ii) 65kg (iii) 150]

34. The following distribution represents the height of 160 students of a school.

Heights in cm	140-145	145-150	150-155	155-160	160-165	165-170	170-175	175-180
No. of students	12	20	30	38	24	16	12	8

Draw an ogive for the given distribution taking 2 cm = 5 cm of height on one axis and 2 cm = 20 students on the other axis. Using the graph, determine: i) the median height. ii) the interquartile range iii) if above 172 cm is consider as the tall boy. Find the percentage of students who are tall. [A: (i) 160cm (ii) 12.75cm (iii) 10]

35. The following distribution represents the marks obtained by 120 students of a test.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	5	9	16	22	26	18	11	6	4	3

Draw an ogive and hence, estimate: i) the median marks. ii) the interquartile range iii) the number of students who did not pass the test if the pass percentage was 50%. [A: (i) 43 (ii) 26 (iii) 78]

36. At shooting competition, the scores of a competitor were as given bellow:

Score	0	1	2	3	4	5
No. of shots	0	3	6	4	7	5

What was his (i) modal score (ii) median score (iii) total score (iv) mean score. [A: (i) 4 (ii) 3 (iii) 80 (iv) 3.2]

37. Find the mode of the following distribution by drawing a histogram.

Mid value	12	18	24	30	36	42	48
Frequency	20	12	8	24	16	8	12

Also state the modal class. [A: 30.5 ; 27-33 ]

38. The distribution given below shows the marks obtained by 25 students in an aptitude test. Find the mean, median and mode. [A: Mean = 6.84 Median = 3.5 Mode = 3 ]

Marks obtained	5	6	7	8	9	10
No. of students	3	9	6	4	2	1

39. Find the mode of the following distribution by drawing a histogram: [A: Rs 46.5 ]

Daily wages (in Rs)	31-36	37-42	43-48	49-54	55-60	61-66
No. of workers	6	12	20	15	9	4

**Ch17. Probability**

1. Two coins are tossed once. What is the probability of getting (i) two heads (ii) at least one tail (iii) exactly one head (iv) atleast one head [A: (i)  $\frac{1}{4}$  (ii)  $\frac{3}{4}$  (iii)  $\frac{1}{2}$  (iv)  $\frac{3}{4}$  ]

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2. An unbiased die is thrown. What is the probability of getting: (i) an even number (ii) a multiple of 3 (iii) a number 3 or 4 (iv) a number less than 5 (v) an odd number (vi) a number greater than 3. (vii) a prime factor of 6.  
[A: (i)  $\frac{1}{2}$  (ii)  $\frac{1}{3}$  (iii)  $\frac{1}{3}$  (iv)  $\frac{2}{3}$  (v)  $\frac{1}{2}$  (vi)  $\frac{1}{2}$  (vii)  $\frac{1}{3}$ ]
3. One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting (i) the queen of diamonds (ii) a king (iii) a black king (iv) a spade card (v) a diamond 10 (vi) not a diamond (vii) not an ace.  
[A: (i)  $\frac{1}{52}$  (ii)  $\frac{1}{13}$  (iii)  $\frac{1}{26}$  (iv)  $\frac{1}{4}$  (v)  $\frac{1}{52}$  (vi)  $\frac{3}{4}$  (vii)  $\frac{12}{13}$ ]
4. A child has a block in the shape of a cube with one letter written on each face as shown below:
- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| A | B | C | D | E | A |
|---|---|---|---|---|---|
- The cube is thrown once. What is the probability of getting (i) A (ii) D. [A: (i)  $\frac{2}{6}$  (ii)  $\frac{1}{6}$ ]
5. An integer is chosen from the first twenty natural numbers. What is the probability that it is a prime number? [A:  $\frac{2}{5}$ ]
6. There are 7 defective items in a sample of 35 items. Find the probability that an item chosen at random is non-defective. [A:  $\frac{4}{5}$ ]
7. Three rotten eggs are mixed with 12 good ones. One egg is chosen at random. What is the probability of choosing a good egg? [A:  $\frac{4}{5}$ ]
8. It is given that in a group of 3 students, the probability of 2 students having not same birthday is 0.992. What is the probability that 2 students have the same birthday? [A: 0.008]
9. A bag contains 8 red, 6 white and 4 black marbles. A marble is drawn at random from the bag. Find the probability that the marbles drawn is (i) Red or white (ii) not black (iii) neither white nor black. [A: (i)  $\frac{7}{9}$  (ii)  $\frac{7}{9}$  (iii)  $\frac{4}{9}$ ]
10. Five cards – the ten, jack, queen, king and ace, are well shuffled with their face downwards. One card is then picked up at random.  
(i) What is the probability that the card is a queen?  
(ii) If the queen is drawn and put aside, what is the probability that the second card picked up is a (a) an ace (b) a queen. [A: (i) 1/5 (ii) a. 1/4 b. 0]
11. A letter is chosen at random from the word 'ASSASSINATION'. Find the probability that the letter chosen is a  
(i) vowel (ii) consonant (iii) none of the letters of the word 'radian'. [A: (i)  $\frac{6}{13}$  (ii)  $\frac{7}{13}$  (iii)  $\frac{6}{13}$ ]
12. If 65% of the populations have black eyes, 25% have brown eyes and the remaining has blue eyes. What is the probability that a person selected at random has  
(i) Blue eyes (ii) Brown or black eyes (iii) Blue or black eyes. [A: (i) 1/10 (ii) 9/10 (iii) 3/4]
13. A jar contains 24 marbles, some are green and others are blue. If a marble is drawn at random from the jar, the probability that it is green is  $\frac{2}{3}$ . Find the number of blue marbles in the jar. [A: 8]
14. A box contains 12 balls out of which x are black. If one ball is drawn at random from the box, what is the probability that it will be a black ball? If 6 more black balls are put in the box the probability of drawing a black ball is now double of what it was before. Find x? [A: 3]
15. A die is numbered in such a way that its faces show the numbers 1, 2, 2, 3, 3, 6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws: What is the probability that total score is (i) even? (ii) 6? [A: (i) 1/2 (ii) 1/9]
16. Find the probability of having 53 Sundays in (i) a leap year (ii) a non leap year [A: (i) 2/7 (ii) 1/7]
17. Find the probability of getting 53 Fridays in a leap year. [A: 2/7]
18. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is thrice that of a red ball, determine the number of blue balls in the bag. [A: 15]
19. A ticket is drawn from a bag containing 100 tickets. The tickets are numbered from one to hundred. What is the probability of getting a ticket with a number  
(i) a perfect square (ii) not a perfect cube (iii) divisible by 10. [A: (i) 1/10 (ii) 24/25 (iii) 1/10]
20. A bag contains 6 white balls numbered from 1 to 6 and 4 red balls numbered from 7 to 10. A ball is drawn at random. Find the probability of getting (i) an even-numbered ball (ii) a white ball. [A: (i) 1/2 (ii) 3/5]
21. Piggy bank contains 100 fifty-paise coins, 50 one-rupee coins, 20 two-rupees coins and 10 five-rupees coins. One coin is drawn at random. Find the probability that the drawn coin  
(i) will be a fifty-paise coin (ii) will not be a five-rupees coin. [A: (i) 5/9 (ii) 17/18]
22. Sixteen cards are labelled with alphabets 'a' to 'p'. They are put in a box and shuffled. A boy is asked to draw a card from the box. Find the probability that the letter chosen is a  
(i) vowel (ii) consonant (iii) none of the letters of the word 'median'. [A: (i)  $\frac{1}{4}$  (ii)  $\frac{3}{4}$  (iii)  $\frac{5}{8}$ ]
23. There are 25 discs numbered 1 to 25. They are put in a closed box and shaken thoroughly. A disc is drawn at random from the box. Find the probability that the number on the disc is:  
(i) an even number (ii) divisible by 2 and 3 both (iii) divisible by 2 or 3. [A: (i) 12/25 (ii) 4/25 (iii) 16/25]