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India's Number 1 Education App

MATHS

BOOKS - ICSE

CHAPTERWISE REVISION (STAGE 1)

Rational And Irrational Numbers

1. Insert a rational number and an irrational number between 5 and 6.

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2. Insert two rational numbers and two irrational numbers between $\sqrt{3}$ and $\sqrt{8}$.

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3. Insert three irrational numbers between 5 and 7.

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4. State which of following real numbers are:

$-8, 0, \sqrt{5}, \frac{5}{7}, -\sqrt{18}, \sqrt{32}, 4.28, \pi, 3, -\frac{8}{15}, 0.07$

rational

(ii) irrational

(iii) positive integers

(iv) negative integers

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5. Examine whether the following numbers are rational or irrational :

$\left(3-\sqrt{5}\right)^2$

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6. Examine whether the following numbers are rational or irrational :

$(7-\sqrt{7})(7+\sqrt{7})$

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7. Examine whether the following numbers are rational or irrational :

$(2\sqrt{3}+3\sqrt{2})^2$

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8. Examine whether the following numbers are rational or irrational :

$(2\sqrt{3}-3\sqrt{2})(2\sqrt{3}+3\sqrt{2})$

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9. Examine whether the following numbers are rational or irrational :

$5\sqrt{3} \times \sqrt{12}$

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10. Write the least (smallest) rationlising factor of :

$\sqrt{12}$

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11. Write the least (smallest) rationlising factor of :

$2\sqrt{12}$

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12. Write the least (smallest) rationlising factor of :

$\sqrt{18}$

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13. Write the least (smallest) rationlising factor of :

$\frac{1}{\sqrt{5}}$

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14. Write the least (smallest) rationlising factor of :

$\sqrt{\frac{2}{3}}$

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15. Rationlise the denominator and simplify:

$$\frac{1}{2+\sqrt{3}}$$

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16. Rationlise the denominator and simplify:

$$\frac{3}{4-\sqrt{3}}$$

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17. Rationlise the denominator and simplify:

$$\frac{2}{\sqrt{5}+\sqrt{3}}$$

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18. Rationlise the denominator and simplify:

$$\frac{12\sqrt{2}}{\sqrt{3}+\sqrt{6}}$$

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19. Rationlise the denominator and simplify:

$$\frac{1}{2\sqrt{5}-\sqrt{3}}$$

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20. Rationlise the denominator and simplify:

$$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$$

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21. Simplify: $\frac{4+\sqrt{5}}{4-\sqrt{5}}+\frac{4-\sqrt{5}}{4+\sqrt{5}}$

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22. Simplify :

$$\frac{3}{5-\sqrt{3}}+\frac{2}{5+\sqrt{3}}$$

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23. Simplify :

$$\frac{5-\sqrt{10}}{5+\sqrt{10}}-\frac{5+\sqrt{10}}{5-\sqrt{10}}$$

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24. Simplify :

$$\frac{7}{\sqrt{17}-2\sqrt{3}}-\frac{3}{\sqrt{17}+2\sqrt{3}}$$

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25. Find the value of m and n : if :

$$\frac{3+\sqrt{2}}{3-\sqrt{2}} = m + n\sqrt{2}$$

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26. Find the value of m and n : if :

$$\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = m + n\sqrt{3}$$

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27. By rationalising the denominator of each of the following : Find in each case, the value correct to two significant figures :

$$\frac{1}{3-\sqrt{2}}$$

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28. By rationalising the denominator of each of the following : Find in each case, the value correct to two significant figures :

$$\frac{1}{2+\sqrt{3}}$$

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29. By rationalising the denominator of each of the following : Find in each case, the value correct to two significant figures :

$$\frac{4}{3\sqrt{2}-2\sqrt{3}}$$

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Compound Interest

1. Calculate the compound interest on rupes 18,000 at 10 % per annum in two years.

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2. Manoj invest rupes 12,000 for 3 years at 10 % per annum . Calculate the amount and the compound interest that Manoj will get at the end of 3 years .

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3. A sum of rupes 1,536 , put at compund interest amounts to rupes 1,632 in one years How much would it amount to in the second year?

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4. Calculate the compound interest for the second year on rupes 12,000 invested for 3 year at 10 % per year. Also find the sum due at the end of the third year.

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5. A certain sum . At compound interest, becomes rupes 7.396 in 2 year and rupes 7,950. 70 in 3 years Find the rate of interest.

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6. The value of a car is depreciating at 5% per year and is 3,15,875 afer 2 years . What was its original price?

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7. A sum of money is lent at 8% per annum compound interest. If the interest for the second year exceeds that for the first year by rupes 32 , find the sum of money.

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8. A man invest rupes 7,000 for three years , at a certain rate of interest , compounded annually At the end of one year it amount rupes 7,980 Calculate

the rate of interest per annum

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9. A man invest rupes 7,000 for three years , at a certain rate of interest , compounded annually At the end of one year it amount rupes 7,980 Calculate

the rate of interest per annum

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10. A man invest rupes 7,000 for three years , at a certain rate of interest , compounded annually At the end of one year it amount

rupes 7,980 Calculate

the amount at the end of the third year.

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11. 8,000 were invested at 5% per annum C.I. compounded annually .

Find :

the amount at the end of the second year.

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12. 8,000 were invested at 5% per annum C.I. compound annually .

Find :

the interest for the third year.

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13. Simple interest on a certain sum of money at 9% is rupees 450 in 2 years . Find the compound interest. On the same sum , at the same rate for 1 year, if the interest is reckoned half yearly .

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14. Find the differnece between simple interest and compound interest on rupes 4,000 and for two years at 10 % per annum .

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15. Simple interest on a certain sum of money for 3 years at 5% per annum is rupes 600. find the amount due and compound interest on this sum at the same rate after 3 years. The interest being reckoned annually.

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16. On what sum of money will the difference between simple interest and compound interest for 2 years at 5% per annum be equal to rupes 50?

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17. The difference between compound and simple interest on a sum of money deposited for 2 years at 5% per annum is rupes 12 . Find the sum of money.

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18. A man invests rupes 3000 for three years at compounds interest . After one years . The money amount to rupes 3,240 find the rate of interest and the amount (to the nearst rupee) due at the end of 3 years.

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19. A sum of rupe 4,0000 was lent for one year at 16% per annum . If the same sum is lent for the same time and at the same rate percent but compounds half-yearly , how much more will the interest be?

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20. Find the amount of 36,000 after 2 years, compounded annually, the rate of interest being 10% for the first year and 12% for the second year.

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21. Find, to the nearest rupee, the amount and the compound interest on 9000 for $1\frac{1}{2}$ years at 8% per annum, the interest being compounded half-yearly.

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22. The difference between the compound interest and the simple interest acrued on an amount of 18,000 in 2 years is 405. Find the rate of interest per annum

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23. The cost of a car, purchased 2 years ago depreciates at the rate of 20% per year. If its present value in 3,15,600, find :

Its value , when it was purchased 2 years ago.

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24. The cost of a car, purchased 2 years ago depreciates at the rate of 20% per year. If its present value in 3,15,600, find :

Its value , when it was purchased 2 years ago.

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Expansions

1. If a $+\frac{1}{a}=2,$ find $\frac{a^4+1}{a^2}$

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2. If a $+\frac{1}{a}=2,$ find $\frac{a^8+1}{a^4}$

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3. If a - $\frac{1}{a}=3,$ find $a^2+3a+\frac{1}{a^2}-\frac{3}{a}$

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4. If a+ b = 4 and ab =3 , find $\frac{1}{b^2}+\frac{1}{a^2}$

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5. If $x^2+\frac{1}{x^2}=7$. find the values of ,

$x-\frac{1}{x}$

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6. If $x^2+\frac{1}{x^2}=7$. find the values of ,

$x+\frac{1}{x}$

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7. If $x^2 + \frac{1}{x^2} = 7$. find the values of ,

$3x^2 - \frac{3}{x^2}$

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8. If $a - \frac{1}{a} = 5$, find $a^2 + \frac{1}{a^2} - 3a + \frac{3}{a}$.

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9. If $a + b = 7$ and $ab = 6$, find $a^2 - b^2$

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10. If $a^2 + b^2 = 13$ and ab= 6 find:

$a + b$

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11. If $a^2 + b^2 = 13$ and ab= 6 find:

$a - b$

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12. If $a^2 + b^2 = 13$ and ab= 6 find:

$a^2 - b^2$

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13. If $a^2 + b^2 = 13$ and ab= 6 find:

$3(a + b)^2 - 2(a - b)^2$

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14. If $a^2 - 3a - 1 = 0$, find the value of $a^2 + \frac{1}{a^2}$

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15. If $x = \frac{1}{x-5}$, find:

$x - \frac{1}{x}$

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16. If $x = \frac{1}{x-5}$, find:

$x + \frac{1}{x}$

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17. If $x = \frac{1}{x-5}$, find:

$x^2 - \frac{1}{x^2}$

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18. If x $= \frac{1}{x-5}$, find:

$x^2 + \frac{1}{x^2}$

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19. If x- y = 7 and $x^3 - y^3 = 133$. find :

xy

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20. If x- y = 7 and $x^3 - y^3 = 133$. find :

$x^2 + y^2$

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Factorisation

1. Factorise :

$b^2 + c^2 + 2bc - a^2$

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2. Factorise :

$a^2 - b^2 - c^2 + 2bc$

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3. Factorise :

$a + 2b + a^3 + 8b^3$

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4. Factorise :

$x^2 - \frac{8}{x}$

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5. Factorise :

$a - 3b + a^3 - 27b^3$

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6. Factorise :

$a^2 + bc - ac - b^2$

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7. Factorise :

$4a^2 - 4ab + b^2 - 4x^2$

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8. Factorise :

$(2a - 3)^2 - 2(2a - 3)(a - 1) + (a - 1)^2$

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9. Factorise :

$(a + b)^2 - 5(a^2 - b^2) - 24(a - b)^2$

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10. Factorise :

$(a^2+1)b^2-b^4-a^2$

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11. Factorise

$3(2x-y)^3+9(2x-y)^2$

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12. Factorise

$a^2+b-ab-a$

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13. Factorise

$$x^2 + \frac{1}{x^2} + 2 - 5x - \frac{5}{x}$$

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14. Factorise

$$1 - (2x - 3y)^2$$

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15. Factorise

$$x(x - a) - y(y - a)$$

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16. Factorise

$x^2 - 2y + xy - 4$

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17. Factorise

$32a^4 - 8a^2$

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18. Factorise

$2(ab + cd) - a^2 - b^2 + c^2 + d^2$

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19. Factorise

$(1-a^2)(1-b^2)+4ab$

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20. Factorise

$(x^2+y^2-z^2)^2-4x^2y^2$

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21. Factorise

$8(3x-2y)^2-6x+4y-1$

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22. Factorise

$27 - x^3y^3 + 6 - 2xy$

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23. Factorise

$(2x - y)^2 - 14x + 7y - 18$

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24. Factorise

$98(a + b)^2 - 2$

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25. Factorise

$81x^4 - 16y^4$

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26. Factorise

$(2a + b)^3 - (a + 2b)^3$

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Simultaneous Equations

1. Solve :

$3x - 5y + 1 = 0$

$2x - y + 3 = 0$

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2. Solve :

$3x + 2y = 14$

$-x + 4y = 7$

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3. Solve :

$2x + 7y = 11$

$5x + \frac{35}{2}y = 25$

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4. Solve :

$8x + 13y - 29 = 0$

$12x - 7y - 17 = 0$

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5. Solve :

$12x + 15y + 18 = 0$

$18x - 7y + 86 = 0$

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6. Solve: $3(2x + y) = 7xy$

$3(x + 3y) = 11xy, x \neq 0, y \neq 0$

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7. Solve : $\frac{2}{x} + \frac{2}{3y} = \frac{1}{6}$ and $\frac{3}{x} + \frac{2}{y} = 0.$

Hence , find 'm' for which y = mx-4 .

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8. Solve : $4x + \frac{6}{y} = 15$ and $6x - \frac{8}{y} = 14.$

Hence , find the value of ' k ' , if $y = kx - 2$

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9. Solve :

$3(2u + v) = 7uv$

$3(u + 3v) = 11uv$

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10. Solve the following system of equations:

$\frac{3}{x+y} + \frac{2}{x-y} = 2, \quad \frac{9}{x+y} - \frac{4}{x-y} = 1$

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11. Solve: $217x + 131y = 913\ 131x + 217y = 827$

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12. Use method of cross-multiplications to solve:

$2x + y = 8$ and $3x - 2y = 5$

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13. Use method of cross-multiplications to solve:

$x + 4y = 3$ and $2x + 9y = 5$

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14. Seven times a two digit number is equal to four times the number obtained by reversing the order of digits. Find the number, if thedifference between its digits is 3.

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15. A and B each have a certain number of mangoes. A says to B, if you give 30 of your mangoes, I will have twice as many as left with you. B replies, if you give me 10, I will have thrice as many as left with you. How many mangoes does each have?

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16. A person can row a boat at the rate of 5 km/hour in still water. He takes thrice as much time in going 40 km upstream as in going 40 km downstream. Find the speed of the stream.

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17. If I is added to each of the two certain numbers, their ratio is 1 : 2, and if 5 is subtracted from each of the two numbers, their ratio becomes 5:11. Find the numbers.

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18. The area of a rectangle increases by 200 sq, m, if the length is increased by 8 m and the breadth by 3 m. The area increases by 255 sq. m, if the length is increased by 3 m and breadth by 8m. Find the length and the breadth of the rectangle.

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Indices

1. If $25^{x+1} = \frac{125}{5^x}$, find the value of x.

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2. If $8^x \times 4^y = 32$ and $81^x \times 27^y = 3$, find the value of x and y

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3. Given $\left(\frac{8}{27}\right)^{x-1} = \left(\frac{9}{4}\right)^{2x+1}$, find the value of x .

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4. Evaluate:

$$\sqrt{\frac{1}{4}} + (0.01)^{-\frac{1}{2}} \times (5) - (27)^{\frac{2}{3}}$$

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5. Evaluate :

$$\left(\frac{1}{4}\right)^{-2} - 3(32)^{\frac{2}{5}} \times (7)^{0} + \left(\frac{9}{16}\right)^{-\frac{1}{2}}$$

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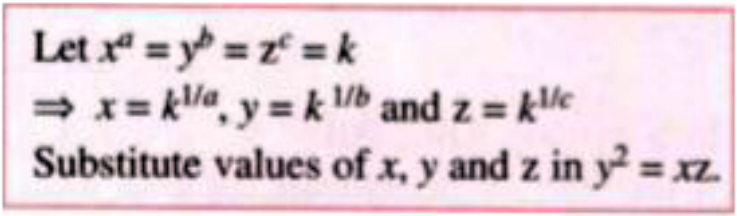
6. If $x^a = y^b = z^c$ and $y^2 = xz$, prove that $b = \dfrac{2ac}{a+c}$



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7. Evaluate :

$$\frac{1}{(216)^{\frac{-2}{3}}} + \frac{1}{(27)^{\frac{-4}{3}}}$$

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8. Evaluate :

$$\left[5\left(8^{\frac{1}{3}} + 27^{\frac{1}{3}}\right)^3\right]^{\frac{1}{4}}$$

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9. If $\frac{\left(3\frac{1}{4}\right)^4 - \left(4\frac{1}{3}\right)^4}{\left(3,\frac{1}{4}\right)^2 - \left(4,\frac{1}{3}\right)^2} = \left(\frac{13a}{12}\right)^2$, find a.

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10. Solve for x and y , if :

$\left(\sqrt{27}\right)^x \div 3^{y+4} = 1$ and $8^{4-\frac{x}{3}} - 16^y = 0.$

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11. If a= -1 and b= 2 find :

$a^2 + b^2$

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12. If a= -1 and b= 2 find :

$a^b - b^a$

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13. If a= -1 and b= 2 find :

$a^b \times b^a$

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14. If a= -1 and b= 2 find :

a^b / b^a

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Logrithms

1. Find the value of :

$\log_3 27$

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2. Find the value of :

$\log_5, 625$

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3. Find the value of :

$\log_2, 0.125$

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4. Find the value of :

$\log_5 0.2$

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5. Find the value of :

$\log_{0.2} 5$

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6. Find the value of :

$\log_{10} 0.001$

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7. If log 4= 0.602 and log 27 = 1.431 , find :

$\log 8$

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8. If log 4= 0.602 and log 27 = 1.431 , find :

$\log 12$

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9. Express in terms of log 2 and log 3 :

$\log \frac{\sqrt{8}}{27}$

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10. Express in terms of log 2 and log 3 :

$\log \left(\sqrt{54} \times \sqrt[3]{243}\right)$

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11. Simplify :

$\log \frac{75}{16} - 2\log \frac{5}{9} + \log \frac{32}{243}$

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12. Simplify :

$2\log\frac{15}{8} - \log\frac{25}{162} + 3\log\frac{4}{9}$

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13. Let $\log x = 2m - 3n$ and $\log y = 3n - 2m$ Find the value of $\log\left(\frac{x^3}{y^2}\right)$ in terms of m and n.

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14. Find x, if :

$2 + \log x = \log 45 - \log 2 + \log 16 - 2\log 3.$

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15. If l= $\log \frac{5}{7}, m = \log \frac{7}{9}$ and $n = 2\left(\log 3 - \log \sqrt{5}\right)$, find the value of

$l + m + n$

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16. If = $\log \frac{5}{7}, m = \log \frac{7}{9}$ and $n = 2\left(\log 3 - \log \sqrt{5}\right)$, find the value of

7^{l+m+n}

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17. Given $\log_{10} x = 2a$ and $\log_{10} y = \frac{b}{2}$.

Write 10^a in terms of x.

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18. Given $\log_{10} x = 2a$ and $\log_{10} y = \frac{b}{2}$.

Write 10^{2b+1} in terms of y .

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19. Given $\log_{10} x = 2a$ and $\log_{10} y = \frac{b}{2}$.

If $\log_{10} P = 3a - 2b$ express P in terms of x and y.

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20. If $x = 1 + \log 2 - \log 5, y = 2\log 3$ and $z = \log a - \log 5,$ find the value of a, if x + y = 2z.

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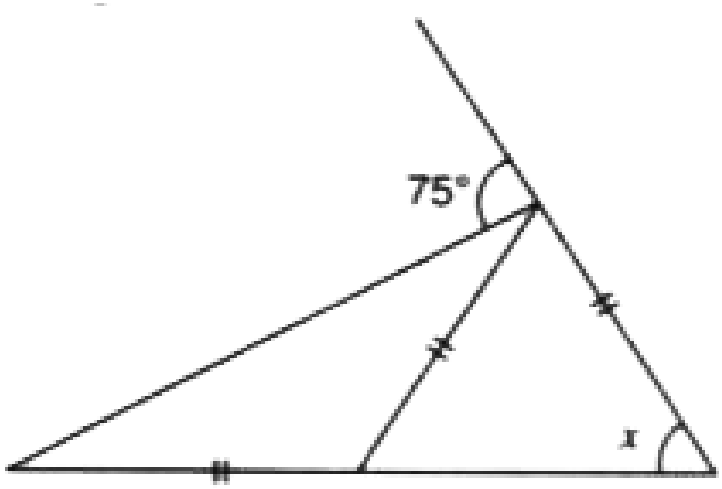
Triangles

1. Find the numerical vlaue of x from the diagram given below.



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2. In ΔPQR, $PQ = PR$. A is a point in PQ and B is a point in PR , so that

QR = RA = AB = BP

show that : $\angle P : \angle R = 1 : 3$

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3. In ΔPQR, $PQ = PR$. A is a point in PQ and B is a point in PR , so that

QR = RA = AB = BP

Find the vlaue of $\angle Q$.

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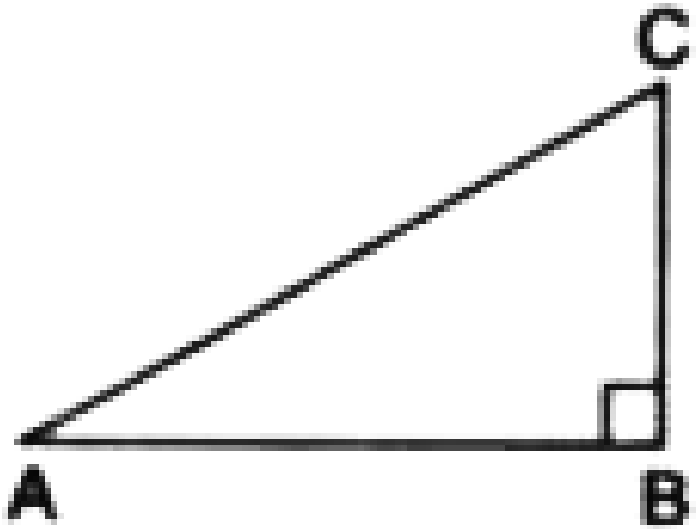
4. The given figure shows a right triangle right angled at B .

If $\angle BCA = 2\angle BAC$, show that $AC = 2BC$



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5. In ΔABC, $AB = AC$ and D is a piont in side BC such that AD bisect angle BAC.

Show that AD is perpendicular bisector of side BC.

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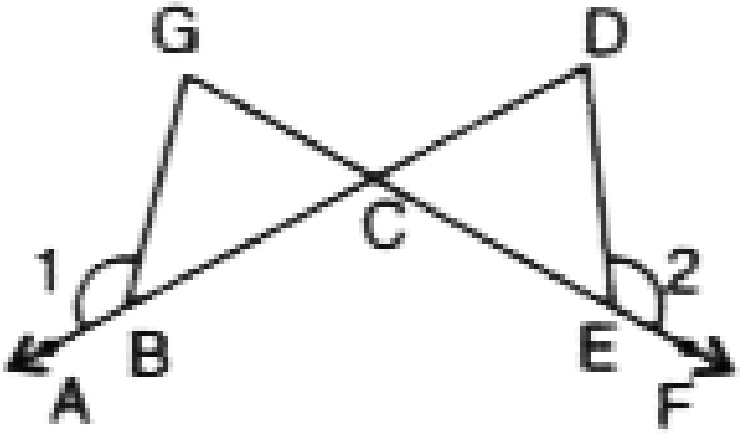
6. In the given figure , BC = CE and $\angle 1 = \angle 2$.

Prove that :

$\Delta GCB = \Delta DCB$.



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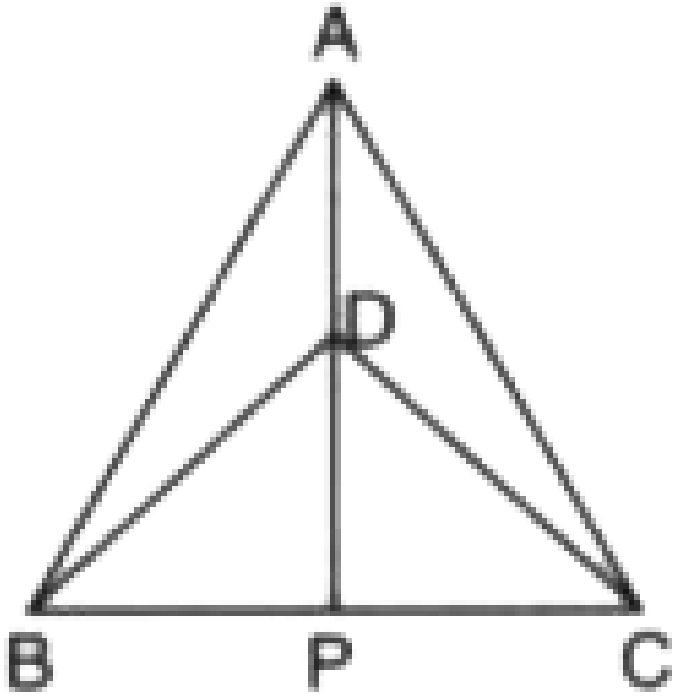
7. The given figure shows two isosceles triangles ABC and DBC with common base BC. AD is extended to intersect BC at point P. Show that:

$\Delta ABD = \Delta ACD$

(ii) $\Delta ABP = \Delta ACP$

(iii) AP bisects $\angle BDC$

(iv) AP is perpendicular bisector of BC.



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8. Two sides AB and BC and median AD of triangle ABC are respectively equal to sides PQ and QR and median PN of ΔPQR. Show

that:

$\Delta ABD = \Delta PQN$

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9. Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of ΔPQR . Show that $\Delta ABC \Delta PQR$.

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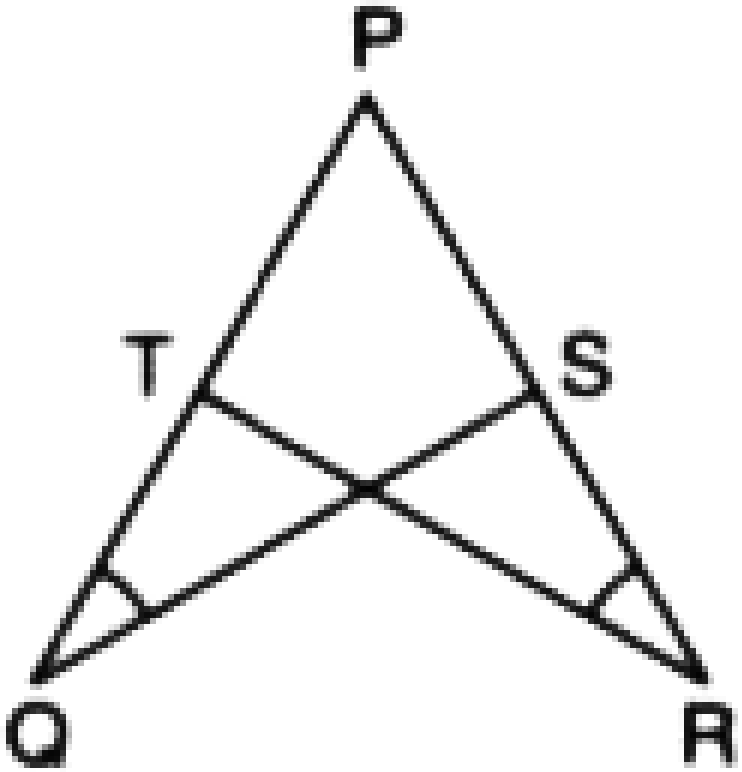
10. The given figure shows $PQ = PR$ and $\angle Q = \angle R$.

Prove that $\Delta PQS = \Delta PRT$



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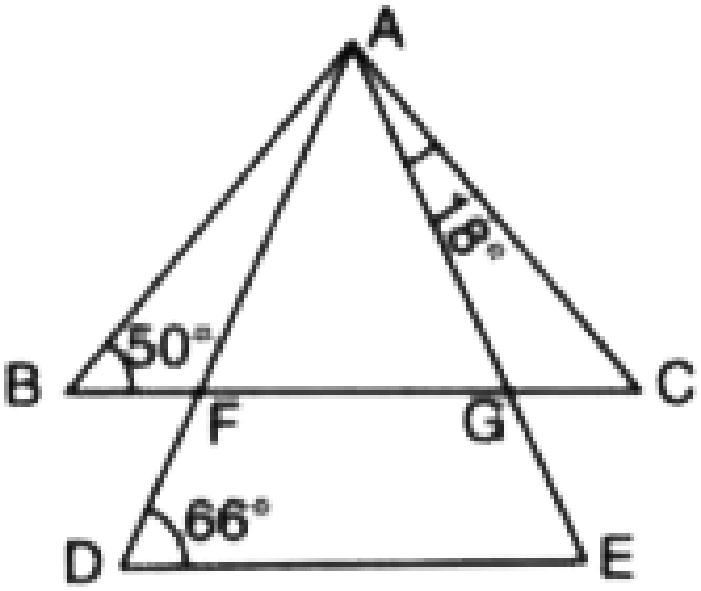
11. In the following figure , AB = BC and AD = DE.

if $\angle B = 50^\circ, \angle D = 66^\circ$ and $\angle GAC = 18^\circ$ find the measure of

angles DAE, BAF and AGF.



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12. In $\Delta ABC, AB = BC, AD \perp BC$ and $CE \perp AB$, prove that AD = CE.

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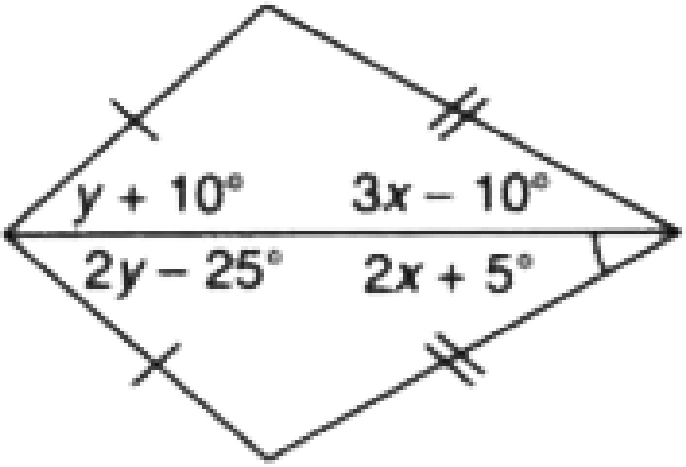
13. Use the informations given in the following figure to find the values of x and y .



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14. If the bisector of an angle of a triangle bisects the opposite side, prove that the triangle is isosceles.

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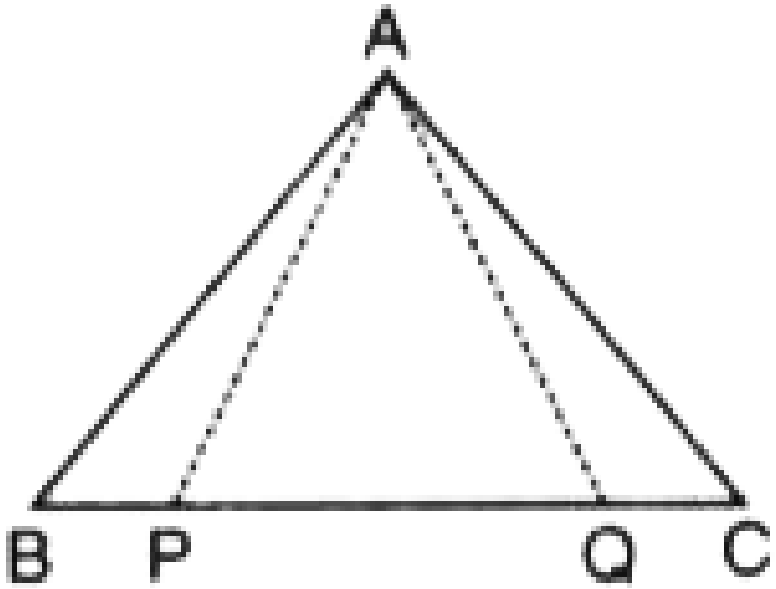
15. The given figure shows a ΔABC in which AB =AC and BP =CQ .

Prove that :

(i) $\Delta ABQ \cong \Delta ACP$.

(ii) ΔAPQ is isosceles.



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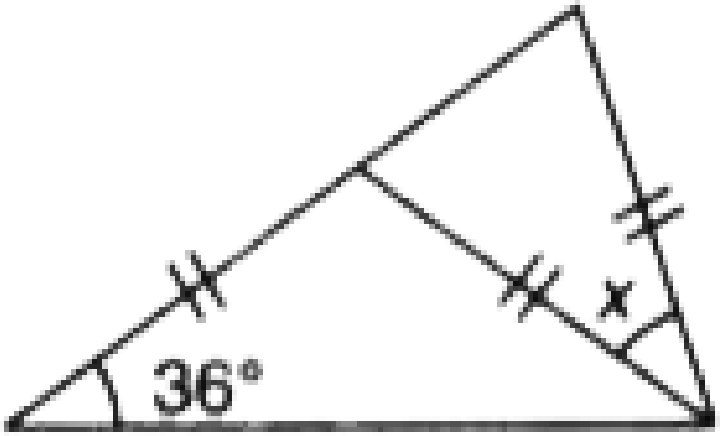
16. Use the given figure to find the angle x.



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17. In a triangle ABC , AB = AC and $\angle A = 36^\circ$ If the internal bisector of angle C meets AB at D . Prove that AD = BC.

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18. In a triangles ABC , $\angle A = x^\circ, \angle B = (3x-2)^\circ$ and $\angle C = y^\circ$, Also , $\angle C - \angle B = 9^\circ$

Find all the three angles of the ΔABC.

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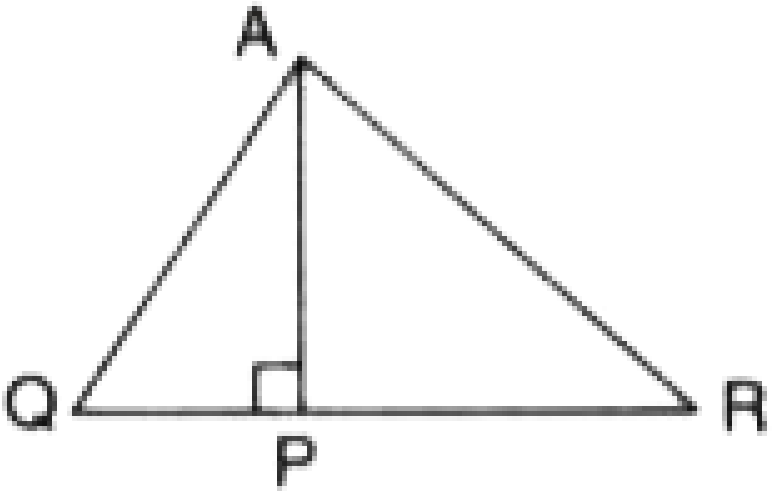
Inequalities

1. In the given figure , $PR > PQ$

Prove that : $AR > AQ$



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2. Using the informations given in the adjoining figure , write the sides of ΔBOC in ascending order of length.

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3. Two sides of a triangles are 12 cm and 7 cm , find the range for the length of its third side.

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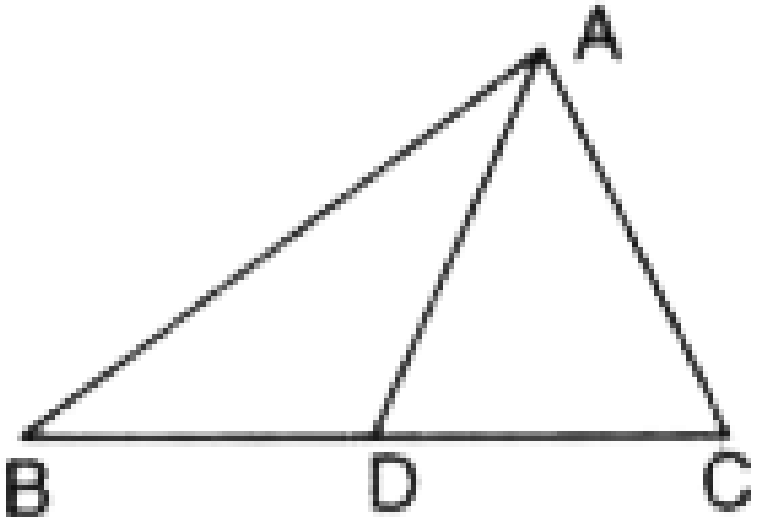
4. In the given figures, AB > AC and D is any point on BC.

Prove that : AB >AD.



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5. In quadrilateral ABCD ,side DC is largest show that AB + AD > DC - BC

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Mid Point And Intercept Theorem

1. If D is the mid-point of the hypotenuse AC of a right triangle ABC, prove that $BD = \frac{1}{2}AC$

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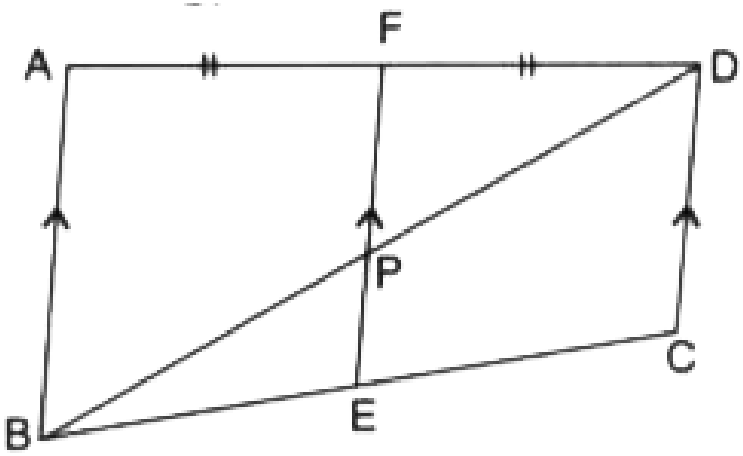
2. In the figure given below, AF = DF and AB //FE // DC.



Prove that

$$FP = \frac{1}{2}AB$$

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3. In ΔABC, $AB = AC$. D, E and F are mid-points of the sides BC, CA and AB respectively . Show that :

AD is perpendicular to EF.

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4. In $\Delta ABC, AB = AC. D, E$ and F are mid-points of the sides BC, CA and AB respectively . Show that :

AD and FE bisect each other.

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5. ABC is a triangle right angled at C and M is mid-point of hypotenuse AB. Line drawn through M and parallel to BC intersects AC at D. Show that:

MD is mid-point of AC.

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6. ABC is a triangle right angled at C and M is mid-point of hypotenuse AB. Line drawn through M and parallel to BC intersects AC at D. Show that:

MD is mid-point of AC.

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7. ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Show that (i) D is the mid-point of AC (ii) $MD \perp AC$ (iii) $CM = MA = \frac{1}{2}AB$

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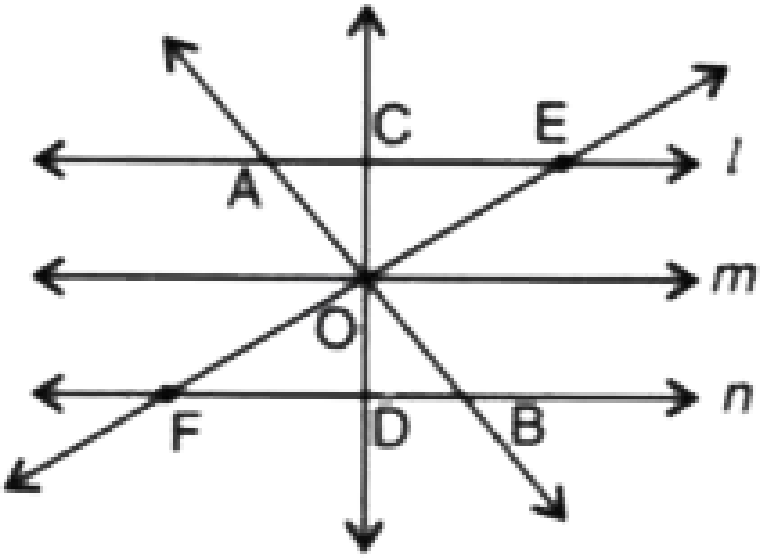
8. In the following figure ,l // m//n. If OC = OD = 5 cm

OA = 8 cm and OE 10 cm find OB and OF



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9. In trapezium ABCD, AB//DC. M is mid point of AD and N is mid-point of BC.

If AB = 8 cm and DC = 11 cm , find MN.

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10. In trapezium ABCD, AB//DC. M is mid point of AD and N is mid-point of BC.

If AB = 5.7 cm and MN = 6.2 cm , find DC.

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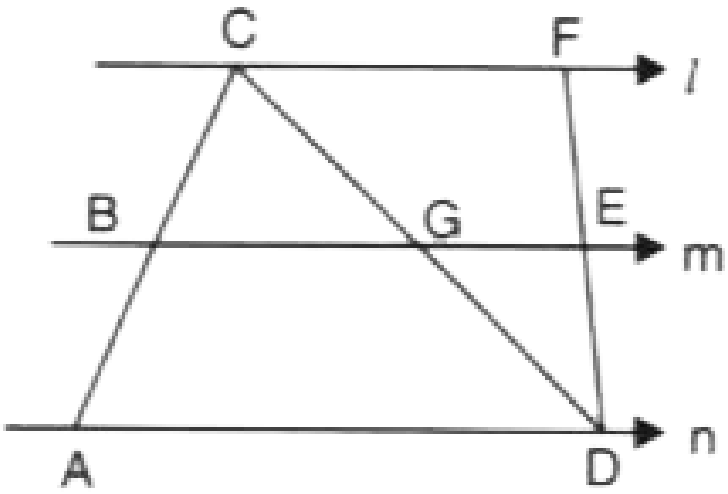
11. In the following figure, straight lines . m and n are parallel to each other and is the mid-point of CD. Find

(1) BG, if AD = 12 cm

(ii) CF, if GE = 4.6 cm

(iii) AB, if BC = 4.8 cm

(iv) ED, if FD = 8.8 cm



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Pythagoras Therorem

1. A right triangle has hypotenuse of length $p\,cm$ and one side of length $q\,cm$. If $p-q=1$, find the length of the third side of the triangle.

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2. In a quadrilateral ABCD $\angle B = \angle D = 90^\circ$ Prove that : $2AC^2 - BC^2 = AB^2 + AD^2 + DC^2$

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3. In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$.

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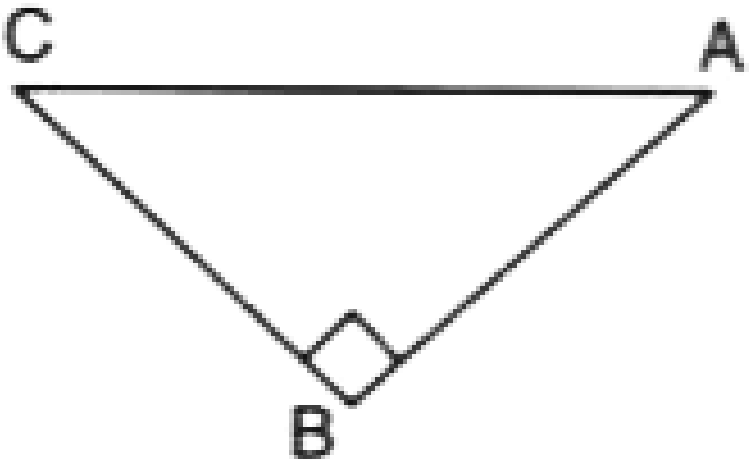
4. In the following figure, $\angle ABC = 90^\circ$ AB = (x+8) cm , BC = (x+ 1) cm and AC = (x+15) cm.

Find the lengths of the sides of the triangles.



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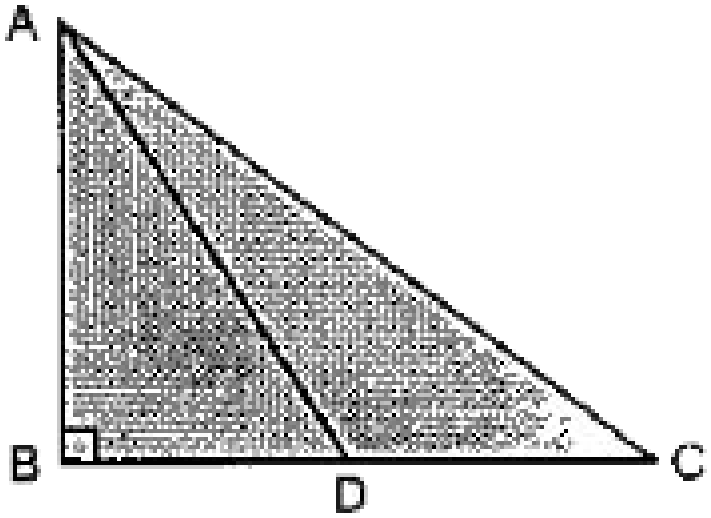
5. In the given figure, triangle ABC is a right triangle with $\angle B = 90^\circ$ and D is mid-point of side BC. Prove that :

$AC^2 = AD^2 + 3CD^2$



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6. In triangle ABC, $\angle ABC - 90^\circ$, $AB = 2a + 1$ and $BC = 2a^2 + 2a$. Find AC in terms of 'a' if a= 8 , find the lengths of the sides of the triangles.

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7. In a right angled triangle, five times the square on the hypotenuse is equal to four times the sum of the squares on the medians drawn from the acute angles. Prove it.

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8. In an equilateral triangle ABC, BE is perpendicular to side CA. Prove that:

$AB^2 + BC^2 + CA^2 = 4BE^2$

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9. In a quadrilateral ABCD, $\angle B = 90^\circ$ and $\angle D = 90^\circ$. Prove that :

$$2AC^2 - AB^2 = BC^2 + CD^2 + DA^2$$

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Rectillinear Figures

1. The ratio between the number of sides of two regular polygons is 3 : 4 and the ratio between the sum of their interior angles is 2:3. Find the number of sides in each polygon.

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2. If the difference between an interior angle of a regular polygon of (n + 1) sides and an interior angle of a regular polygon of n sides is 4° , find the value of n. Also, state the difference between their exterior angles.

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3. In a quadrilateral ABCD, angles A, B, C and D are in the ratio 3:2:1:4 Prove that AD is parallel to BC.

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4. In a quadrilateral ABCD, AB = CD and $\angle B = \angle C$. Prove that $AC = AB$

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5. In a quadrilateral ABCD, AB = CD and $\angle B = \angle C$. Prove that AD is parallel to BC.

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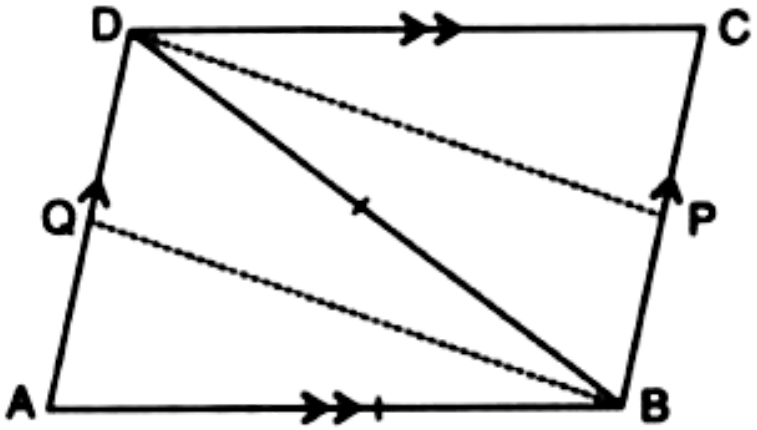
6. In the diagram below, P and Q are midpoints of sides BC and AD respectively of the parallelogram ABCD. If side AB = diagonal BD:

prove that the quadrilateral BPDQ is a rectangle.



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7. ABCD is a parallelogram. If AB = 2AD and P is the mid-point of CD, prove that $\angle APB = 90^\circ$

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8. Construct a parallelogram ABCD in which diagonal AC = 6-3 cm, diagonal BD = 7cm and the acute angles between the diagonals is 45°

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9. Construct a rhombus whose diagonals are 4.7 cm and 5-4 cm.

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10. In a parallelogram ABCD, P is a point on side AD such that 3AP = AD and Q is a point on BC such that 3CQ = BC. Prove that : AQCP is a parallelogram.

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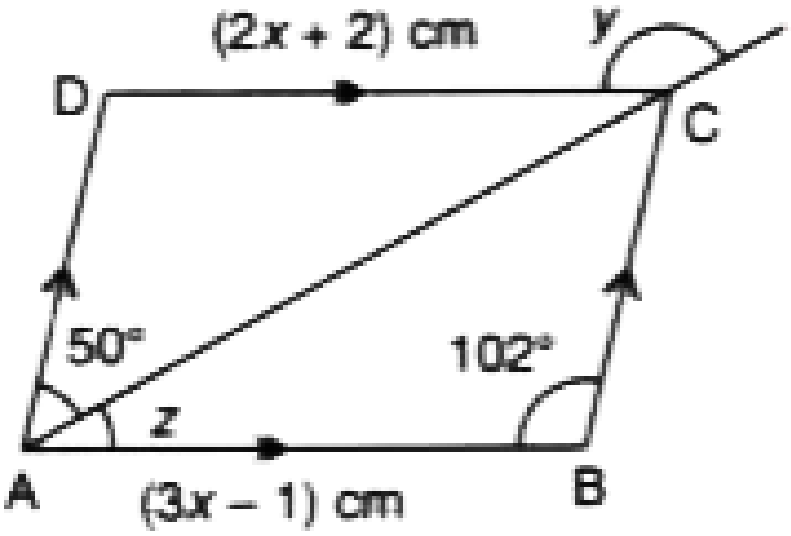
11. The following figure shows a parallelogram ABCD. Use the given informations to find the values of x, y and z.



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12. The angles of a quadrilateral are equal. Prove that the quadrialteral is rectangle.

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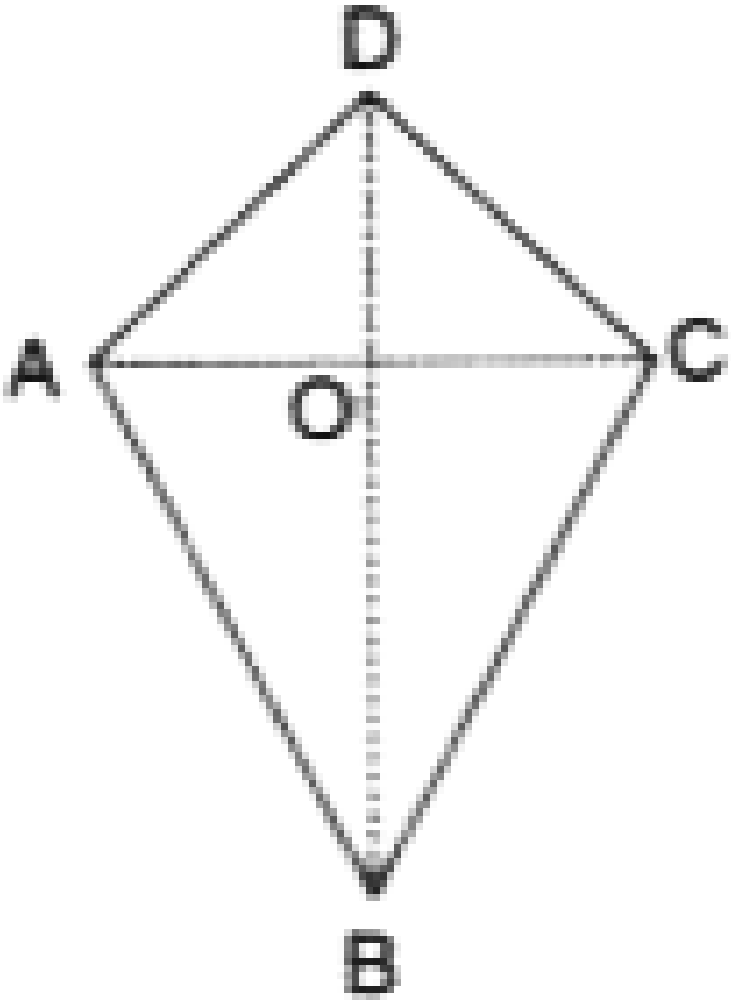
13. The given figures shows a kite- shaped figure whose diagonals intersect each other at point O. if

$\angle ABO = 25^\circ$ and $\angle OCD = 40^\circ$, Find

(i) $\angle ABC$

(ii) $\angle ADC$

(iii) $\angle BAD$



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14. In a parallelogram, prove that the bisectors of any two consecutive angles intersect at right angle.

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15. Two opposite angles of a parallelogram are $(6x - 17^\circ)$ and $(x + 63)^\circ$. Find each angle of the parallelogram.

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16. The diagonals of a rectangle intersect each other at right angles. Prove that the rectangle is a square.

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17. M and N are the points of trisection of the diagonal BD of a parallelogram ABCD. Prove that CN is parallel to AM.

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18. Find the angles of the parallelogram ABCD, If

$\angle A, \angle B = 2:7$

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19. Find the angles of the parallelogram ABCD, if

$\angle C = \frac{2}{3}\angle D$

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20. Construct a quadrilateral ABCD with $\angle B = \angle C = 75^\circ, BC = 6m, AB = 4.8cm$ and $CD = 5cm.$

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21. Construct a parallelogram ABCD with diagonals 6.3 cm and 5.6 cm .

And, acute angle between the diagonals is 45°

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22. Construct a squre ABCD with AC = 6.2 cm.

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23. Construct a rhombus ABCD such that each of its side is 4.8 cm and $\angle A = 120^\circ$

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24. Construct a trapezium ABCD in which AB is parallel to DC, AB = 6.4 cm ,AD=3.5cm, $\angle A = 60^\circ$ and $\angle B = 75^\circ$

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Area Theorems

1. D, E and F are the mid-points of the sides BC, CA and AB respectively of triangle ABC. Prove that:

BDEF is a parallelogram.

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2. D, E and F are the mid-points of the sides BC, CA and AB respectively of triangle ABC. Prove that:

area of BDEF is half the area of ΔABC.

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3. Given a parallelogram ABCD where X and Y are the mid-points of the sides BC and CD respectively . Prove that:

ar $(\Delta AXY) = \frac{3}{8} \times ar(/gm)ABCD$

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4. ABCD is a parallelogram of area 162 sq. Cm P is a point on AB such that AP : PB = 1 :2

Calculate

The area of ΔAPD

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5. ABCD is a parallelogram of area 162 sq. Cm P is a point on AB such that AP : PB = 1 :2

Calculate

The ratio of PA : DC.

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6. The area of the figure formed by joining the mid-points of the adjacent sides of a rhombus with diagonals $16cm\ and\ 12cm$ is $28\ cm^2$ (b) $48\ cm^2$ (c) $96\ cm^2$ (d) $24\ cm^2$

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7. In trapezium ABCD, side AB is parallel to side DC. Diagonals AC and BD intersect at point P. Prove that triangles APD and BPC are equal in area.

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8. P is the mid-point of diagonal AC of quadrilateral ABCD. Prove that the quadrilaterals ABPD and CBPD are equal in area.

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9. In triangle ABC, D is mid-point of AB and P is any point on BC. If CQ parallel to PD meets AB at Q, prove that: $2 \times \text{ area } (\Delta BPQ) = \text{ area } (\Delta ABC)$

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10. In ΔABC ,D is a point in side AB and E is a point in AC. If DE is parallel to BC, and BE and CD intersect each other at point 0, prove that:

$\text{area } (\Delta ACD) = \text{ area } (\Delta ABE)$

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11. In ΔABC ,D is a point in side AB and E is a point in AC. If DE is parallel to BC, and BE and CD intersect each other at point 0, prove that:

$$\text{area } (\Delta OBD) = \text{area } (\Delta OCE)$$

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Circle

1. A chord of length 16 cm is drawn in a circle of diameter 20 cm. Calculate its distance from the centre of the circle.

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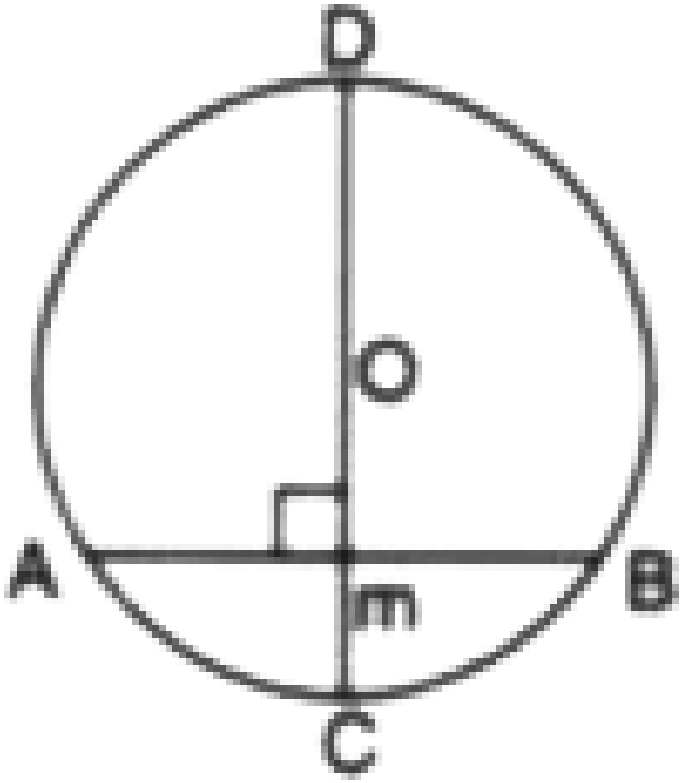
2. In the given figure, the diameter CD of a circle with centre 0 is perpendicular to the chord AB.

If AB = 8 cm and CM = 2 cm, find the radius of the circle.



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3. Two chords AB and CD of lengths 24 cm and 10 cm respectively of a circle are parallel. If the chords lie on the same side of the centre and distance between them is 7 cm, find the length of a diameter of the circle.

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4. Two chords AB and AC of a circle are equal. Prove that the centre of the circle lies on the angle bisector of $\angle BAC$.

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5. In the given figure , arc APB : arc BQC = 2: 3 and $\angle AOC = 150^\circ$, Find :

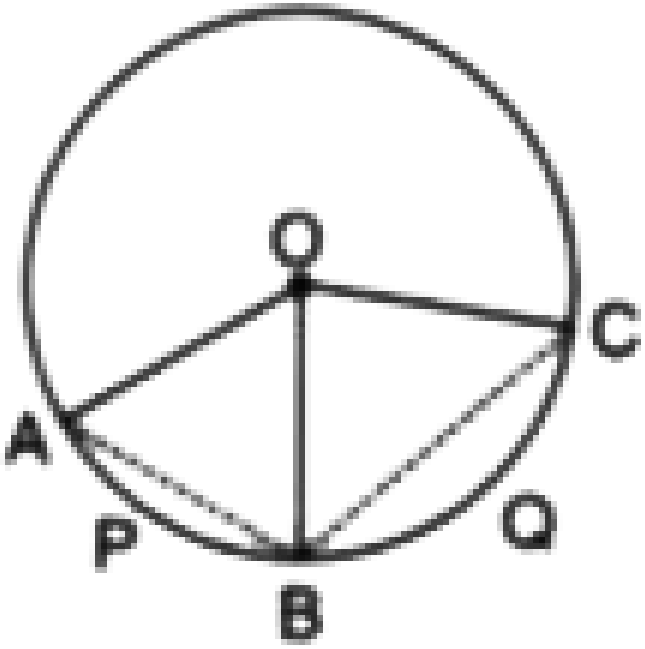
(i) $\angle AOB$

(ii) $\angle BOC$

(iii) $\angle OBA$

(iv) $\angle OCB$

(v) $\angle ABC$



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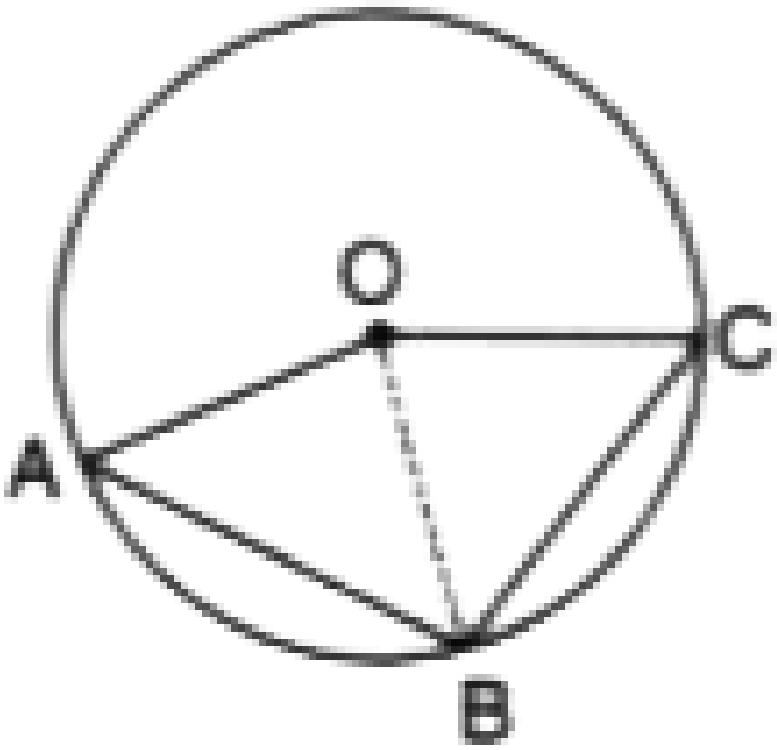
6. In the given figure, AB is a side of a regular pentagon and BC is the side of a regular hexagon. Find

(i) $\angle AOB$

(ii) $\angle OBC$



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Statistics

1. The cost of 250 articles is given below :

Cost (in ₹)	No. of articles
less than 20	22
less than 30	40
less than 40	75
less than 50	190
less than 60	228
less than 70	250

Construct a frquency distribution table for the data given above. Also , answer the following:

(i) how many articles cost from rupes 30 to less than rupes 50?

how many articles have cost at most rupes 40 ?

(iii) how many articles have cost at least rupes 50?

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2. The class marks of a distribution are 62, 67, 72, 77, 82 and 87. Find the class-size and class-limits

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3. By taking classes 30 - 40, 40 - 50, 50 - 60,.. ., construct a frequency table for the following data:

65 34 74 49 52 35

71 55 61 40 56 38

52 56 52 33 60 35

49 37 53 50 44 30

62 50 47 45 47 50

63 61 54 58 47 64

37 38 44 42 47 55

70 33 75 49 47 30

60 69

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4. State, which of the following variable are continuous and which are discrete:

marks scored in a test.

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5. State, which of the following variable are continuous and which are discrete:

daily temperatue of a city

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6. State, which of the following variables are continuous and which are discrete :

sizes of shoes.

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7. State, which of the following variable are continuous and which are discrete:

distances covered by a train.

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8. State, which of the following variables are continuous and which are discrete :

time.

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9. The table , given below , shows the frequency distributions of the weekly wages of the employee of a company:

Weekly wages (in ₹)	Number of empolyees
800 – 899	22
900 – 999	27
1000 – 1099	23
1100 – 1199	18
1200 – 1299	15

Find :

(i) the lower limit of the fourth class.

(ii) the upper limit of the fifth class.

(iii) the class boundaries of the second class.

(iv) the class mark of the first class.

(v) the class size of the third class.

(vi) cumulative frequency of the fourth class.

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Mean And Median

1. Find the mean of

5,15,20 , 8 and 12

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2. Find the mean of

28,24, 37,42,56,59,67,28,15 and 32.

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3. Find the mean of the following data: 18, 33, 30, 21 and 13.

Also, find the sum of deviations of this data from the mean.

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4. If 150 is the mean of 200 observations and 100 is the mean of some 300 other observations, find the mean of the combination.

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5. The mean of a certain number of observations is 35. What is the new value of the mean if each observation is :

increased by 7.

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6. The mean of a certain number of observations is 35. What is the new value of the mean if each observation is :

decreased by 5.

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7. The mean of a certain number of observations is 35. What is the new value of the mean if each observation is :

Multiplied by 2.

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8. The mean of a certain number of observations is 35. What is the new value of the mean if each observation is :

divided by 5.

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9. The mean of a certain number of observations is 35. What is the new value of the mean if each observation is :

increased by 20%

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10. The mean of a certain number of observations is 35. What is the new value of the mean if each observation is :

decreased by 20%

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11. Find the median of 17, 26, 60, 45, 33, 32, 29, 34 and 56. If 26 is replaced by 62, what will be the new median?

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12. The following data have been arranged in ascending order of magnitude.

63, 66, 69, x, x + 2, 76, 89 and 103.

If the median of the given data is 71, find the value of x.

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Area And Perimeter Of Plane Figures

1. An isosceles right-angled triangle has area 200 cmWhat is the length of its hypotenuse?

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2. The perimeter of a triangle is 540 m and its sides are in the ratio 12 : 25 : 17. Find the area of the triangle.

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3. Find the area of triangle whose sides are 5 cm, 12 cm and 13 cm. Also, find the length of its altitude corresponding to the longest side.

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4. The diagonals of a rhombus are 24 cm and 10 cm. Calculate its area and perimeter.

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5. The diagonals of a field in the form of a quadrilateral are 106 m and 80 m and intersect each other at right angles. Find the cost of cultivating the field at the rate of 25.50 per 100 m^2

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6. If the difference between the two sides of a right-angled triangle is 2 cm and the area of the triangle is $24cm^2$, find the perimeter of the triangle.

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7. Calculate the area of quadrilateral ABCD In which $\angle A = 90^\circ, AB = 16cm. AD = 12cm$ and $BC = CD = 12.5cm$

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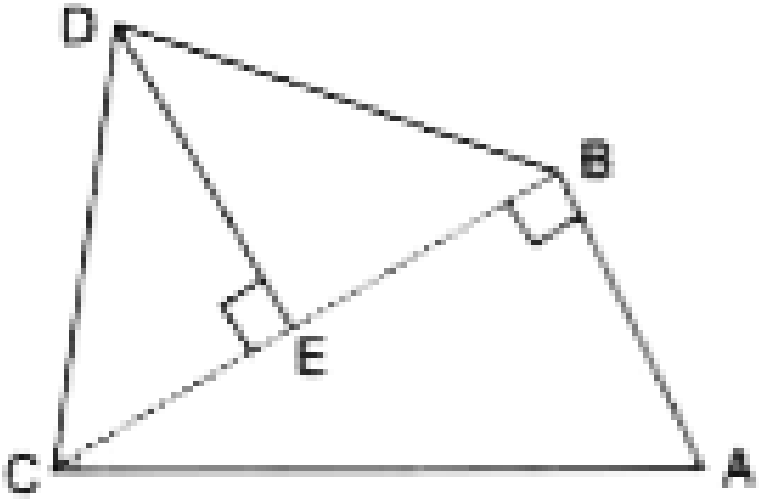
8. In the given figures, $\angle ABC = 90^\circ = \angle DECAC = 15cm$ and $AB = 9cm.$ If the area of the quadrilateral ABCD is $72cm^2$: find the length of DE.



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9. How many square tiles of side 40 cm will be required to pave a footpath which is 2 m wide and surrounds a rectangular plot 80 m by 44 m ?

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10. The cost of papering four walls of a room at 14 per square metre is 3,150. The height of the room is 5 metres. Find the length and the breadth of the room, if they are in the ration 4 : 1.

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11. A circle is inscribed in a square of side 14 cm. Find the area enclosed between the square and the circle.

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12. The ratio between the diameters of two cirlces is 3:5. Find the ratio between their : (i) radii (ii) circumferences (iii) areas.

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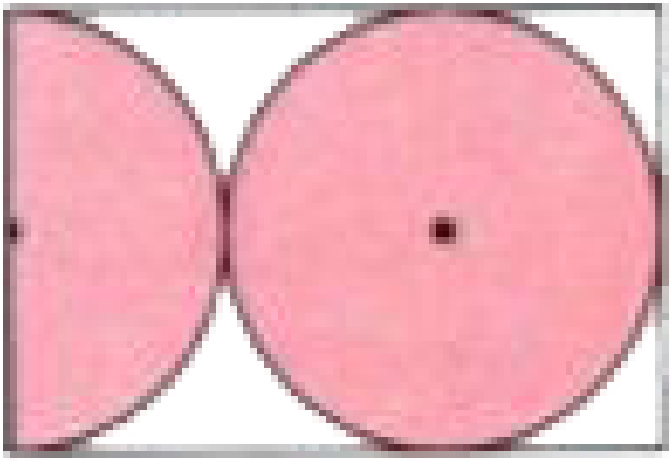
13. Find the ratio between the area of the shaded and the unshaded portions of the following figure



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14. Calculate the area of triangle whose side are 13 cm, 5 cm and 12 cm. Hence, calculate the altitude corresponding to the longest side of this trianlge. Leave your answer as a fraction.

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15. Find the area of a triangle whose perimeter is 22 cm, one side is 9 cm and the difference of other two sides is 3 cm.

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16. The base of an isosceles triangle is 24 cm and its area is $60cm^2$ Find its perimeter.

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17. The area of a circular ring enclosed between two concentric circles is 286 cm? Find the radii of the two circles, given that their difference is 7 cm.

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Solids

1. Six cubes, each with 12 cm edge, are joined end to end. Find the surface area of the resulting cuboid.

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2. The diagonal of a cube is $16\sqrt{3}$ cm. Find its surface area and volume.

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3. The areas of three adjacent faces of a cuboid are $x,\ y\ and\ z$. If the volume is $V,$ prove that $V^2 = xyz$.

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4. Water flows in a tank $150m \cdot 100m$ at the base, through a pipe whose cross-section is $2dm$ by $1.5dm$ at the speed of 15 km per hour. In what time, will the water be $3metres$ deep?

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5. A cylindrical bucket holds 44.372 litre of water. The water is emptied into a rectangular tank 66 cm long and 28 cm wide. Find the height of the water level in the tank.

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6. The area of cross-section of a pipe is 10.4 cm2 and water is running through it at the rate of 54 km/h. If the pipe is always 60% full, find the volume of water, in litres, that flows through the pipe in 5 minutes.

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7. Length of a room is twice its height and its breadth is $1\frac{1}{2}$ times its height. The cost of white washing the walls at the rate of 32 per sq. m is * 3,584. Find the cost of tiling the floor of the room at 135 per sq. m.

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8. The square on the diagonal of a cube has an area of $192cm^2$ Calculate :

the side of the cube.

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9. The square on the diagonal of a cube has an area of $192cm^2$ Calculate :

the total surface area of the cube.

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10. The volume of a cubical solid is $10368cm^3$ If its diamensions are in the ratio 3 : 2: 1 , find the cost of polishing its total surface at the rate of $2.50 \quad \text{per} \quad m^2$

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11. Squares, each of side 6 cm are cut off from the four corners of a sheet of tin measuring 42 cm by 30 cm. The remaining portion of the

tin sheet is made into an open box by folding up the flaps . Find the capacity of the box formed.

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Trigonometry

1. If cos A = 0.5 and cos B = $\frac{1}{\sqrt{2}}$, find the value of : $\frac{\tan A - \tan B}{1 + \tan A \tan B}$

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2. If cos $A = 4 \sin A,$ find the value of ,$4 \cos^2 A - 3 \sin^2 A + 2$

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3. If $4 \cos^2 A - 3 = 0$ and $0^\circ \leq A \leq 90^\circ$ find :

angla A

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4. If $4\cos^2 A - 3 = 0$ and $0^\circ \leq A \leq 90^\circ$ find :

cos 3A

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5. If $4\cos^2 A - 3 = 0$ and $0^\circ \leq A \leq 90^\circ$ find :

$\tan^2 A + \cos^2 A$

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6. If 2 cos (A-B) = 2 sin (A+ B) $= \sqrt{3}$ find the value of acute angles A and B .

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7. If $\cos A = \frac{9}{41}$, find the value of

$$\frac{1}{\sin^2 A} - \cot^2 A$$

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8. If $(2\cos 2A - 1)(\tan 3A - 1) = 0$, find all possible values of A

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9. If tan A =1 and tan b = $\sqrt{3}$, evaluate :

cos A cos B - sin A sin B.

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10. If tan A =1 and tan b = $\sqrt{3}$, evaluate :

sin A cos B+ cos A sin B.

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11. Find the value of angle A , if :

$\sin 2A = 1$

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12. Find the value of angle A , if :

$2 \sin 2A = 1$

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13. Find the value of angle A , if :

$2 \sin A = 1$

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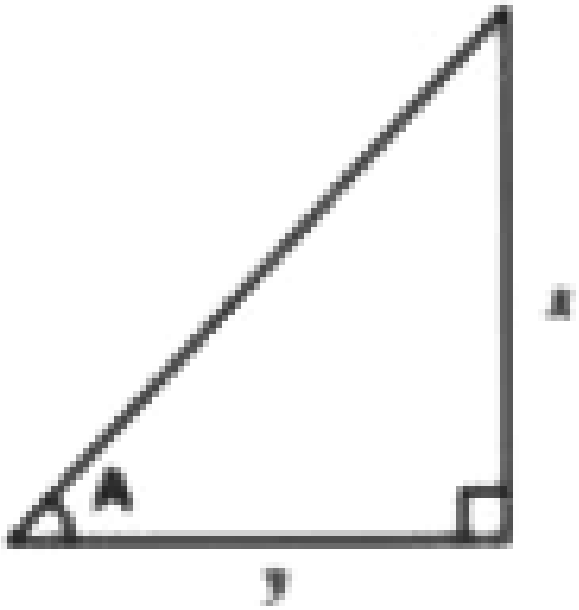
14. Using the given figure , find the value of angle A , if :

(i) x= y

(ii) $x = \sqrt{3}y$

(iii) $\sqrt{3}, x = y$



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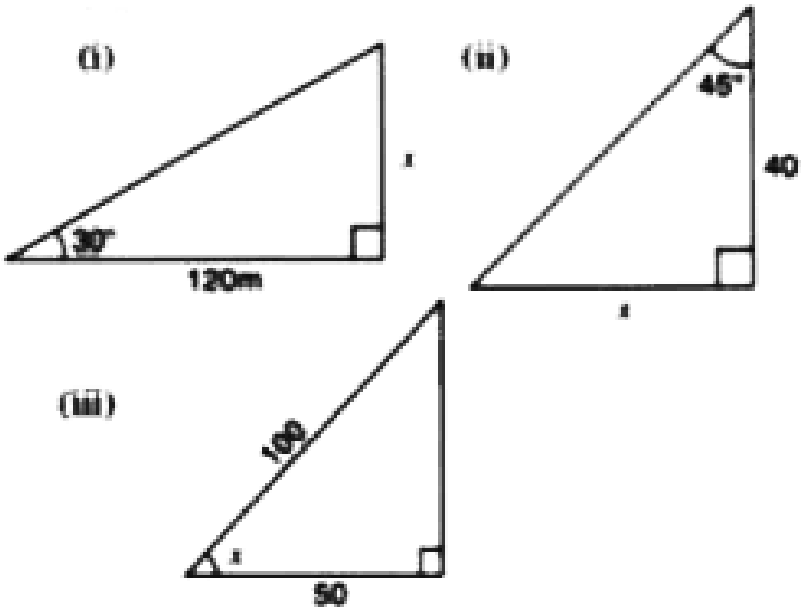
15. Find the 'x' in each of the following



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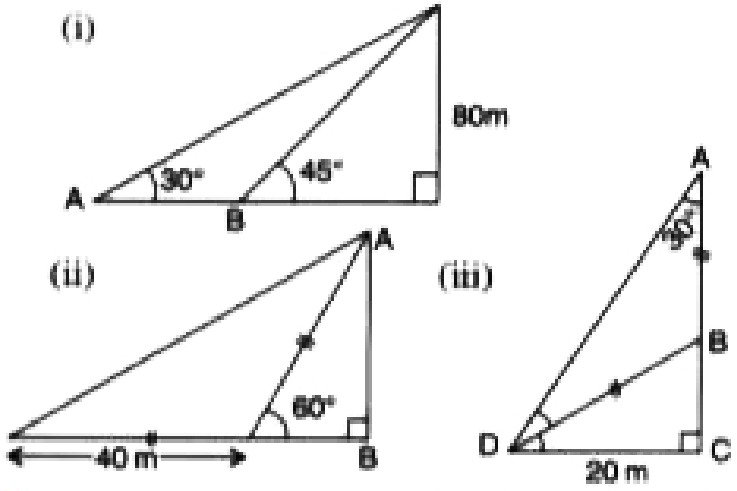
16. In the figures given below , find AB:



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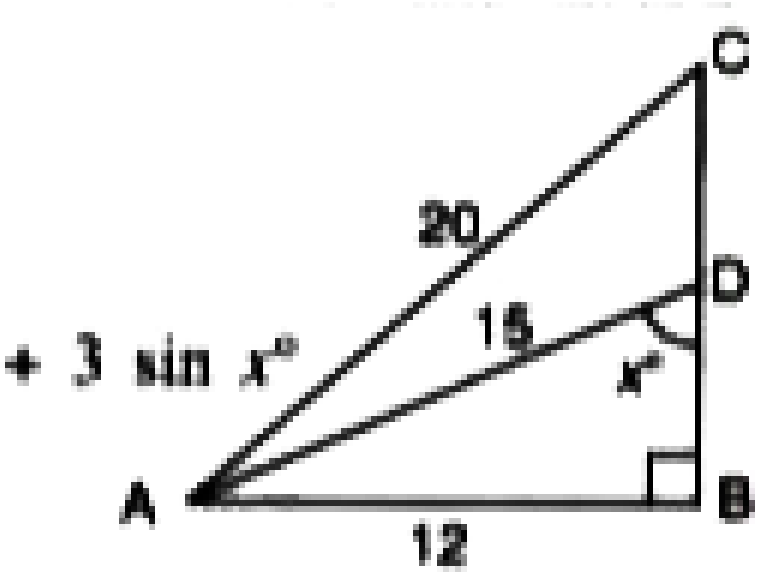
17. In the given figure $\angle B = 90^\circ$ and $\angle ADB = x^\circ$, Find :

(i) $\sin\angle CAB$

(ii)$\cos^2 C^\circ + \sin^2 C^\circ$

(iii) $\tan x^{\circ} - \cos x^{\circ} + 3\sin x^{\circ}$



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18. Evaluate :

$\tan 25^{\circ} \tan 65^{\circ} - \cot 25^{\circ} \cot 65^{\circ}$

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19. Evaluate :

$$\frac{\sec 42^\circ}{\operatorname{cosec} 48^\circ} + \frac{3\tan 50^\circ}{\cot 40^\circ} - \frac{2\cos 43^\circ}{\sin 47^\circ}$$

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20. In $\Delta ABC, \angle B = 90^\circ$

Evaluate : cosec A cos C - sin A sec C .

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21. For triangle ABC prove that $\sec\left(\frac{A+B}{2}\right) = \operatorname{cosec}\frac{C}{2}$

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Co Ordinate Geometry

1. Name the independent and the dependent variables of the following equations:

$y = 2x + 5$

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2. Name the independent and the dependent variables of the following equations:

$x = 8 - 2y$

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3. Name the independent and the dependent variables of the following equations:

$x = \frac{3}{2}y + 4$

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4. Name the independent and the dependent variables of the following equations:

$y = -5x - 8$

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5. For equations given below find the slope and the y- intercept.

$3x + 2y + 4 = 0$

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6. For equations given below find the slope and the y- intercept.

$x - 3y - 8 = 0$

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7. For equations given below find the slope and the y- intercept.

$x + y + 4 = 0$

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8. For equations given below find the slope and the y- intercept.

$x = 3y + 2$

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9. For equations given below find the slope and the y- intercept.

$y = 5 - 4x$

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10. For equations given below find the slope and the y- intercept.

$2y + 5 = 0$

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11. Find the equations of the lines , whose :

slope =- 4 and y- intercepts = 2

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12. Find the equations of the lines , whose :

slope = 0 and y- intercept =- 5

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13. Find the equations of the lines , whose :

slope = 3 and y- intercept =4

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14. Find the equations of the lines , whose :

slope = 1 and y - intercepts =-5

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15. Find the distances between the points

(2,-5) and (7,7)

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16. If A = (x,-7) , B = (2,5) and AB = 13 units , findx.

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17. A is a point on x- axis, and point B (5,-4) and AB = 5 units find the co-ordinates of A.

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18. Show that A (0,0) , B(5,5) and C (-5,5) are vertices of a right angled isosceles triangles.

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19. Show that the points A(6,4) , B(9,7) and C(11,9) are collinear.

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20. What point on y-axis is equidistant from the points (7,6) and (-3,4)?

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21. Calculate the distance between A (7,3) and B on the x-axis whose abscissa is 11.

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22. A is a point on the y-axis whose ordinate is 5 and B = (-3,1) .Find AB.

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23. Show that the point (2,2) is equidistant from the point (-1,-2) and (-3,2) .

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24. The distance between the points (1,3) and (x,7) is 5, find x.

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Graphical Solution

1. Solve the following paris of linear (simultaneous) equation using method of elimination by substution:

2x - 3y = 7

5x + y = 9

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2. Solve , graphically :

$15x - 8y = 29$

$17x + 12y = 75$

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3. Draw the graph of straight line $y = -2x + 3$ use your graph of find :

the intercept on y-axis

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4. Draw the graph of straight line $y = -2x + 3$ use your graph of find :

the area between the line and co-ordinates axes .

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5. Find the graphically, the vertices of the triangle whose sides have the equations $2y - x = 8, 5y - x = 14$ and $y - 2x = 1$ respectively. Take 1 cm=1 unit on both the axes.

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6. From a point 20 m away from the foot of a tower, the angle of elevation of the top of the tower is 30°. Find the height of the tower.

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7. On the same graph paper, draw the straight lines represented by equations :

x= 5 , x+ 5= 0 , y + 3=0 and y = 3

Also find the area and perimeter of the rectangle formed by the intersections of these lines.

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8. On a graph paper, mark the points A(-1,-1) and B(2,5) Draw a straight line passing through A and B. If points (m,4) and (0.5,n) lie on this line , use graphical method of finding the values of m and n .

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9. A triangle is formed by the straight lines $x + 2y - 3 = 0, 3x - 2y + 7 = 0$ and $y + 10 = 0$, find graphically the co-ordinates of the vertices of the triangle

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10. A triangle is formed by the straight lines $x + 2y - 3 = 0, 3x - 2y + 7 = 0$ and $y + 1 = 0$, find graphically the area of the triangle.

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