MATHEMATICS

Time : 3 hours *Maximum Marks : 100*

Notes:- (i) All questions are compulsory.
(ii) Diagram whenever necessary should be neat and accurate.
(iii) Use of Trigonometric table whenever necessary is allowed.

Q.1. Fill in the blanks:

(i) The H.C.F. of 510 and 92 is ..... **(1)**
Sol. 2

(ii) The 10th term of A.P. 2, 7, 12 ..... is ..... **(1)**
Sol. 47

(iii) The zero's of polynomial $x^2 - 9$ are ..... **(1)**
Sol. ± 3

(iv) The bisector of 90° angle is ..... **(1)**
Sol. 45°

(v) The circumference of a circle is ..... **(1)**
Sol. $2\pi r$

(vi) Probability of a sure event is ..... **(1)**
Sol. one

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* **Fill in the blanks:**

(i) The L.C.M. of 12, 15 and 21 is ..... .
Sol. 3

(ii) The 5th term of A.P. 2, 7, 12 ..... is .....
Sol. 22

(iii) In a quadratic equation $ax^2 + bx + c = 0$ $a \neq 0$ the product of the roots is .....
Sol. c/a

(iv) The right bisector of a line divides it into ..... equal parts.
Sol. two

(v) The area of a square whose side is 3 cm is .....
Sol. 9 cm^2

(vi) Probability of an impossible event is .....
Sol. zero

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* **Fill in the blanks:**

(i) The H.C.F. of 26 and 91 is .....
Sol. 13

(ii) The nth term of A.P. is .....
Sol. a+(n–1)d

(iii) In a quadratic equation $ax^2 + bx + c = 0$ $a \neq 0$ thesum of the roots is .....

Sol. $-\frac{b}{a}$

(iv) The right bisector of a line makes an angle of ..... degree.

Sol. 90°

(v) The area of a circle is .....

Sol. πr^2

(vi) A die is rolled once. The probability of getting a prime number is .....

Sol. $\frac{1}{2}$

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* **In each of the following items there are four answers (a), (b), (c) and (d). Write down the correct/appropriate answer on your answer-book:**

(i) 27 is:

(a) an even number **(b) a prime number**

(c) a composite number **(d) None of these**

Ans. (c) a composite number

(ii) $2x^2 + 3x - \frac{2}{5}$ **is:**

(a) a linear polynomial **(b) a quadratic polynomial**

(c) a cubic polynomial **(d) None of these**

Ans. (b) a quadratic polynomial

(iii) The common difference of an A.P – 1.2, –3.2, – 5.2, ... is:

(a) 2 **(b) – 2**

(c) – 3 **(d) None of these**

Ans. (b) – 2

(iv) A circle can have parallel tangents at the most:

(a) One **(b) Two**

(c) Three **(d) None of these**

Ans. (b) Two

(v) The volume of frustum of a cone is:

(a) $\frac{1}{3}\pi l\left(r^2_1 + r^2_2 + r_1 r_2\right)$ **(b)** $\frac{4}{3}\pi l\left(r^2_1 + r^2_2 + r_1 r_2\right)$

(c) $\frac{1}{3}\pi h\left(r^2_1 + r^2_2 + r_1 r_2\right)$ **(d) None of these**

Ans. (c)

(vi) If a die is thrown once, then the probability of getting a prime number is:

(a) $\frac{1}{2}$ (b) $\frac{1}{3}$

(c) $\frac{1}{4}$ (d) None of these

Ans. (a)

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Q.1. In each of the following items there are four answers (a), (b), (c) and (d). Write down the correct/appropriate answer on your answer-book:

(i) 5 is:

(a) an even number (b) a prime number

(c) a composite (d) None of these

Sol. (b) a prime number

(ii) $2 - x^2$ is:

(a) a linear polynomial (b) a quadratic polynomial

(c) a cubic polynomial (d) None of these

Sol. (b) a quadratic polynomial

(iii) The common difference of an A.P. –5, –1, 3 .....

(a) –6 (b) 4

(c) – 4 (d) None of these

Sol. (b) 4

(iv) A tangent to a circle touches it in:

(a) One point (b) Two point

(c) More than two points (d) None of these

Sol. (a) One point

(v) The slant height of a fustum of a cone is:

(a) $\sqrt{h^2 + (r_1 + r_2)^2}$ (b) $\sqrt{h^2 - (r_1 - r_2)^2}$

(c) $\sqrt{h^2 + (r_1 - r_2)^2}$ (d) None of these

Sol. (c) $\sqrt{h^2 + (r_1 - r_2)^2}$

(vi) Probability of a sure event is :

(a) – 1 (b) 0

(c) 1 (d) None of these

Sol. (c) 1

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Q.1. In each of the following items there are four answers (a), (b), (c) and (d). Write down the correct/appropriate answer on your answer-book:

(i) 2 is:

(a) an odd number **(b) a composite number**

(c) a prime number **(d) None of these**

Sol. (c)

(ii) $y^2 - 2$ is:

(a) a linear polynomial **(b) a quadratic polynomial**

(c) a cubic polynomial **(d) None of these**

Sol. (b)

(iii) The common difference of an A.P. 0, – 4, – 8, – 12 .....

(a) 0 **(b) 4**

(c) – 4 **(d) None of these**

Sol. (c)

(iv) A line intersecting a circle is two points is called:

(a) radius **(b) a tangent**

(c) a secant **(d) None of these**

Sol. (c)

(v) Curved surface area of a frustum of a cone is:

(a) $\pi h (r_1 + r_2)$ **(b)** $\pi l (r_1 + r_2)$

(c) $\frac{1}{3} \pi l (r_1 + r_2)$ **(d) None of these**

Sol. (b)

(vi) Chance of throwing 6 with single die is:

(a) 1 **(b) 0**

(c) $\frac{1}{6}$ **(d) none of these**

Sol. (c)

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* **Do as directed:**

(i) The Probability of an event cannot be less than

(a) 1 (b) 0.3

(c) –1 (d) None of these

Ans. (d) None of these

(ii) Define an Odd Number.

Ans. The number which are not even are called odd. e.g. 1, 3, 5 ..... etc.

Or

The number which are not divisible by '2' are called odd number.

(iii) If the radius of a hemisphere is 2 cm, its curved surface area will be.

(a) 2π cm^2 (b) 4π cm^2

(c) 8π cm^2 (d) None of these.

Ans. (c) 8π cm^2

(iv) A polynomial of degree 3 is called a

(a) Cubic polynomial (b) Zero polynomial.

(c) Quadratic polynomial (d) None of these.

Ans. (a) Cubic polynomial.

(v) The next term of :–3.2,–5.2, –7.2 is

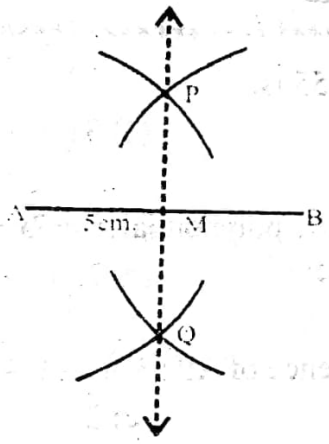
(a) 9.2 (b) –9.2

(c) 11.2 (d) None of these.

Ans. (b) –9.2

(vi) Bisect a line segment of length 5 cm.

Ans.



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* **Do as directed:**

(i) The Probability of an event cannot be less than

(a) –1 and 0 (b) 0 and 1

(c) –1 and 1 (d) None of these

Ans. (b) 0 and 1

(ii) Define an Even Number.

Ans. The number which are divisible by "2" are called even number e.g. 2. 4. 6. 8. ..... ∞.

(iii) Total surface area of hemisphere of radius "r" is

(a) $2\pi r^2$ (b) $3\pi r^2$

(c) πr^2 (d) None of these.

Ans. (b) $3\pi r^2$

(iv) The degree of the polynomial $4x+2$ is

(a) 2 (b) 1

(c) 4 (d) None of these.

Ans. (b) 1

(v) The next term of $\sqrt{8}, \sqrt{18}, \sqrt{32}$, is

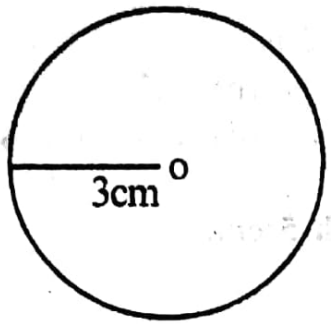
(a) $\sqrt{48}$ (b) $\sqrt{36}$

(c) $\sqrt{50}$ (d) None of these.

Ans. (c) $\sqrt{50}$

(vi) Draw a circle of radius 3 cm.

Sol.



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* H.C.F. of 867 and 255 is:

(a) 41 (b) 51 (c) 31 (d) None of these

Ans. (b)

* The zeros of quadratic polynomial $x^2 + 7x + 10$ is:

(a) –2 , 4 (b) 2, 4 (c) 2, 5 (d) – 2, –5

Ans. (d)

* The common difference of AP : 3, 1, – 1, – 3 is:

(a) – 2 (b) 1 (c) 2 (d) 4

Ans. (a)

* Sides of triangles are 3 cm, 4 cm and 6 cm state whether it is right triangle or Not.

(a) Yes (b) No

(c) Both (a) and (b) (d) None of these

Ans. (b)

* The Slant height of cone with radius and height h is:

(a) $\sqrt{r^2+h^2}$ (b) $\sqrt{r+h}$

(c) $\sqrt{r^2+h}$ (d) None of these

Ans. (a)

* A bag contains 7 Red and 6 green balls. The probability of getting a green ball is:

(a) $\frac{5}{13}$ (b) $\frac{6}{13}$ (c) $\frac{7}{13}$ (d) None of these

Ans. (b)

* H.C.F. of 870 and 225 is:
(a) 15 (b) 25 (c) 10 (d) None of these
Ans. (a)

* The common difference of the following AP: 3, $3+\sqrt{2}$, ... is:
(a) $-\sqrt{2}$ (b) $\sqrt{2}$ (c) $2\sqrt{2}$ (d) None of these
Ans. (b)

* The distance between $P(x_1, y_1)$ and $Q(x_2, y_2)$ is:
(a) $\sqrt{(x_2+x_1)^2+(y_2+y_1)^2}$ (b) $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
(c) $\sqrt{(x_2+x_2)^2+(y_1+y_2)^2}$ (d) None of these
Ans. (b)

* Volume of a frustum of a cone is equal to
(a) $\frac{1}{3}\pi h(r_1 + r_2 + r_1r_2)$ (b) $\pi l(r_1+r_2)$
(c) $\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1r_2)$ (d) None of these
Ans. (c)

* Probability of sure event is:
(a) –1 (b) 0 (c) 3 (d) 1
Ans. (d)

* H.C.F. of 135 and 225 is:
(a) 40 (b) 45 (c) 35 (d) None of these
Ans. (b)

* The zeroes of quadratic polynomial $x^2 - 2x - 8$ are:
(a) 2, 4 (b) –2, 4 (c) 4, 1 (d) None of these
Ans. (b)

* Which of the following patterns of number are in A.P?
(a) 4, 3, 2, 1 ..... (b) –9, –7, –3, 1 .....
(c) –3, 0, 3, 6 ..... (d) 0, 3, 6, 10 .....
Ans. (a) and (c)

* The distance between the points P (x, y) from the origin (0, 0) is given by:
(a) $\sqrt{x+y}$ (b) $\sqrt{x^2+y^2}$ (c) x^2+y^2 (d) $x+y$
Ans. (b)

* Volume of hemisphere is:
(a) $\frac{2}{3}\pi r^2$ (b) $\frac{2}{3}\pi r^3$ (c) $\frac{4}{3}\pi r^2$ (d) $\frac{4}{3}\pi r^3$
Ans. (b)

* The probability of an impossible event is:
(a) 1 (b) 0 (c) –1 (d) – 2
Ans. (b)

* LCM of 6 and 20 is 60 and their Product is 120 then HCF of 6 and 20 is:
(a) 2 (b) 4 (c) 6 (d) 10
Ans. (a) 2

* 28^{th} term of the A.P 10, 7, 4 ..... is
(a) –77 (b) –71 (c) 77 (d) –87
Ans. (b) –71

* On dividing a quadratic polynomial by a linear polynomial. The quotient obtained is always.
(a) a Constant (b) a linear Poly
(c) a quadratic Poly (d) a cubic Poly
Ans. (b) a linear Poly

* The distance of the tangent to a circle form its centre is always.
(a) greater than the radius (b) equal to the radius
(c) Less than the radius (d) nothing can be said.
Ans. (b) equal to the radius

* Volume of Sphere of radius is given by:
(a) $\frac{3}{4}\pi r^3$ (b) $\frac{4}{3}\pi r^3$ (c) $\frac{4}{3}\pi r^2$ (b) $\frac{3}{4}\pi r^3$
Ans. (b) $\frac{4}{3}\pi r^3$

* The polynominal $x^2 + 4x + 5$ has:
(a) one zero (b) two zero
(c) three zero (d) None of these
Ans. (b) two zero

* Which term of the AP: 21, 18, 15, ...is zero?
(a) 6th term (b) 7th term
(c) 8th term (d) 9th term
Ans. (c) 8th term

* If $\tan\theta = \frac{5}{12}$, then $\cos\theta$ is equal to:
(a) $\frac{5}{13}$ (b) $\frac{13}{5}$
(c) $\frac{12}{13}$ (d) $\frac{13}{12}$
Ans. (c) $\frac{12}{13}$

* The slant height of a cone whose radius r and height h is:
(a) $r^2 + h^2$ (b) $r^2 - h^2$
(c) $\sqrt{r^2 + h^2}$ (d) None of these

Ans. (c) $\sqrt{r^2 + h^2}$

* The decimal representation of an irrational no. is always:
(a) Non-terminationg. non-repeating
(b) Non-terminating. repreating
(c) Terminating
(d) Terminating. repeating.
Ans. (a) Non-terminationg. non-repeating

* Volume of cone is:
(a) $\frac{2}{3}\pi r^3$ (b) $\frac{1}{3}\pi r^2 h$
(c) $\pi r^2 h$ (d) $4\pi r^3$

Ans. (b) $\frac{1}{3}\pi r^2 h$

* Which of the following pattern of number are in AP?
(a) 2, 4, 8, 14, ... (b) 1, 3, 7. 13, ...
(c) 1. 5. 9. 13, ... (d) 3, 6. 9, 15, ...

Ans. (c) 1, 5, 9, 13, ...

* A dice is thrown, then possiblity of getting multiple of 3 is?
(a) $\frac{1}{6}$ (b) $\frac{1}{3}$
(c) $\frac{1}{2}$ (d) None of these

Ans. (b) $\frac{1}{3}$

* The point (3,–2) lies in which Quadrant:
(a) I^{st} (b) II^{rd}
(c) II^{nd} (d) IV^{th}

Ans. (d) IV^{th}

* Which of the follwoing numbers is even?
(a) 2 (b) 3
(c) 5 (d) 7

Ans. (a) 2

* **H.C.F. of 96 and 404 is:**
(a) 6 (b) 10
(c) 4 (d) 3
Ans. (c)

* **Degree of quadratic polynomial is:**
(a) 1 (b) 3
(c) 2 (d) 4
Ans. (c)

* **If diameter of circle is 14 cm, then the area of circle is:**
(a) 134 cm^2 (b) 164 cm^2
(c) 144 cm^2 (d) 154 cm^2
Ans. (d)

* A tangent PQ at a point P of a circle of radius 5 cm meet a line through the centre O at a point Q so that OQ = 12 cm. Length, PQ is:
(a) 12 cm (b) 8.5 cm
(c) 13 cm (d) $\sqrt{119}$ cm
Ans. (d)

* HCF of 420 and 130 is:
(a) 30 (b) 40
(c) 10 (d) 20
Ans. (c)

* The sum of 12 term of following A.P. –37, –33,–29 .....
(a) –190 (b) –150
(c) –180 (d) –200
Ans. (b)

* The circle which touches all the sides of a triangle is called:
(a) Incircle (b) Circumcircle
(c) Excircle (d) None of these
Ans. (a)

* A bag contains 7 red and 6 green balls. The probability of getting a red ball is:
(a) $\frac{5}{13}$ (b) $\frac{7}{13}$
(c) $\frac{6}{13}$ (d) None of these
Ans. (b)

* Degree of linear polynomial is:
(a) 2 (b) 3
(c) 1 (d) 4
Ans. (c)

* The LCM of 12, 15 and 21 is:
  (a) 340 (b) 440
  (c) 420 (d) 460
  Ans. (c)
* The nth term of AP is $3n - 8$. Its 15th term is:
  (a) 40 (b) 45
  (c) 37 (d) 35
  Ans. (c)

Q.2. Find the distance between the points (–5, 7) and (–1, 3). (2)

Q.3. TP and TQ are the tangents to a circle with centre O, so that <POQ = 110°. Find angle PTQ. (2)

Q.4. If sec 4 A = cosec (A–20), where 4A is an acute angle, find the value of A. (2)

* Find the distance between the pair of points (3, 1) and (6, 4).
* Evaluate: $\frac{\sin 35^\circ}{\cos 55^\circ}$.
* A tangent PQ at a point 'P' of a circle of radius 5 cm meets a line through the centre 'O' at a point 'Q' so that PQ = 12 cm. Find OQ.
* Find the area of the triangle formed by the points (1,-1), (-4,6) and (-3,-5).
* If tan 2A = cot (A–18°), where 2A is an acute angle, find the value of A. (2)
* Find the distance between the points (a, b) and (-a, -b).
* If tan A = cot B, prove that A+B = 90°
* If tangent PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°. Find ∠POA.
* Find the area of the triangle whose vertices are (–5, –1), (3, –5) and (5, 2).
* The vertices of triangle are A(2, 3), B(–1, 0), C(2, –4). Find the area of the triangle.
* If sec 4A= cosec (A–20°), where 4A is an a cute angle, find the value of A.
* If sin 3A = cos (A–26°), where 3A is an acute angle,find the value of A.
* Draw a circle and two lnes parallel to a given line such that one is a tangent and the other, a secant to the circle.
* Find the distance between the points (0,0) and (36, 15).
* Evaluate: cos 48°–sin 42°
* From a point Q, the length of the tangent to a circle is 24 cm and the distance of Q from the centre is 25cm. Find the radius of the circle.
* Evaluate: cos 38° cos 52° – sin 38° sin 52°.

* **The length of a tangent from a point A at a distance 15cm from the centre of the circle is 14 cm. Find the radius of circle.**

* **Evaluate:** $\frac{\sin 18^\circ}{\cos 72^\circ}$

* **A point P is 25 cm from the centre of a circle. The radius of the circle is 7 cm. Find the length of the tangent drawn from P to the circle.**

* Evaluate $\frac{\tan 65^\circ}{\cot 25^\circ}$

* Find the distance between the following pairs of points (2,3). (4. 1)?

* Show that $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1$

* Draw a tangent line to any circle.

* Evaluate: $\frac{\tan 26^\circ}{\cot 64^\circ}$

* The length of a tangent from a point A at a distance 5 cm from the centre of the circle is 4 cm. Find the radius of a circle?

* If $\tan A = \cot B$, Prove that $A + B = 90^\circ$.

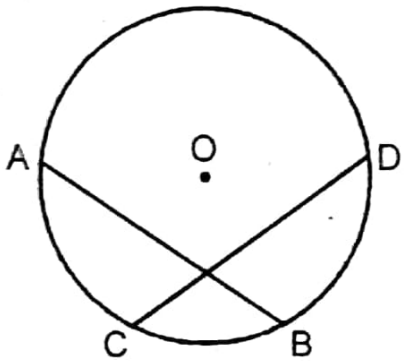
* A tangent PQ at a point P of a circle of radius 6 cm meets a line throgh the centre 'O' at a point Q, so that OQ = 13 cm. find the length PQ.

* Find the values of y for which the distance between the points P(2. –3) and Q(10, y) is 10 units.

* Write the trigonometric rations of 45°.

* ABC is an isosceles Δrt. $\angle$d at C. Prove that:
$AB^2 = 2AC^2$

* If AP = 4 cm, PB = 3cm and CP = 6cm, find PD.



* Given 15 cot A = 8. Find sin A. sec A.

* In Δ ABC rt. $\angle$d at B. if AB = 24. AC = 25. Determine sin A. cos A.

Q.5. Use Euclid's division algorithm to find the H.C.F. of 867 and 255.

Q.6. Find the 31st term of an A.P. whose 11th term is 38 and 16th term is 73. (4)

Q.7. Solve the linear equation by the cross-multiplication method:

$x - 3y = 7$

$3x - 3y = 15$ (4)

Q.8. Five years ago, Nuri was thrice as old as Sonu. Ten years later Nuri will be twice as old as Sonu. How old are Nuri and Sonu? (4)

Q.9. Divide $2t^4 + 3t^3 - 2t^2 - 9t - 12$ by $t^2 - 3$. (4)

Q.10. A bag contains lemon flavoured candieds only. Sara takes out one candy without looking into the bag. What is the probability that she takes out.

(i) an orange flavoured candy

(ii) a lemon flavoured candy? (4)

* Find the zeroes of the Polynomial $6x^2 - 3 - 7x$.
* Find the sum of the first 1000 positive integers.
* The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number.
* Solve the following pair of equations by substitution method:

  $x + y = 14$

  $x - y = 4$
* One card is drawn form a well-shuffled deck of 52 cards. Find the probability of getting:

  (i) a face card

  (ii) a red face card.
* Use Euclid's division alogrithm to find the H.C.F. of 867 and 155.
* Find the zeroes of the polynomial: $6x^2 - 7x - 3$.
* For what value of 'n' are the nth terms of two APs: 63, 65, 67, ... and 3, 10, 17, ... equal?
* Solve the following pair of equations by using cross multiplication method:

  $2x + y = 5$

  $3x + 2y = 8$
* The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them.
* The record of a weather station shows that out of the past 250 consecutive days, its weather forecasts were correct 175 times:

  (i) What is the probability that on a given day it was correct?

  (ii) What is the probability that it was not correct on a given day?
* Divide the polynomial p(x) by the polnomial g(x) and find the quotent and remainder:

  p(x) $x^3 - 3x^2 - 5x - 3$ and g(x) $x^2 - 2$.
* Solve the following pair of linear equations by substitutions method:

  $x - y = 5$ and $2x - 3y = 4$.

* For what values of k will the following pair of linear equation have infinitely many solutions?

  $kx + 3y - (k - 3) = 0$

  $12x + ky - k = 0.$

* If the 3rd and the 9th terms of an A.P. are 4 and –8 respectively, which term of this A.P. is zero.

* A box contains 5 red marbles, 8 white marbles adn4 green marbles. One marble istaken out of the box atrandom. What is the probability that the marble taken out will be

  (i) red?

  (ii) White?

  (iii) not green?

* Solve the following pair of equations by substitution method:

  $2x + 3y = 11$

  $2x - 4y = -24$

* In a Cricket match,a batswoman hits a boundary 6 times out of 30 balls she plays. Find the probability that she did not hit a boundary.

* Use Euclid's division alogrithm to find the H.C.F. of 135 and 225.

* Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

* Use Euclid division Lemna toshow that to show that the cube of any positive intergers is of the form $9m$, $9m + 1$ or $9m + 8$?

* Solve the pairs of linear equation by substitution method:

  $x + 3y = 7$

  $3x + y = 14$

* Find the sum of first 22 terms of an A.P. in which d = 7 and 22 terms is 149.

* A box contains 3 blue, 2 white and 4 red marble. If a marble is drawn at random from the box, what is probability that it will be:

  (i) White

  (ii) Blue

  (iii) Red

* Solve the linear equation by the elemination method:

  $x + 3y = 8$

  $4x + 11y = 4$

* Find the L.C.M. and H.C.F. by the prime factorisation method of 12,15 and 21.

* In an AP is given that $Q_{12} = 37$, $d = 3$. Find a and S_{12}.

* Find the HCF of 96 and 404 by Prime factor isation method. Hence find their LCM.

* Find the sum of the AP: 34 + 32 + 30 + ...10

* Find the zeroes of the Quadratic polynomial $x^2 + 7x + 10$. Verify the relationship between zeroes of the coefficients.
* Two coins are toséd simultaneously 500 times and we get two heads 105 times. one head 275 times, no head 120 times. Find the probability of occurence of each events.

Q.11. Find the roots of a quadratic equation $2x^2 - 7x + 3 = 0$, if they exist by the method of quadratic formula. (6)

Or

Sum of the areas of two squares is 468 m^2. If the difference of their perimeters is 24 m, find the sides of the two squares.

* Find the value of 'K' of the following quadratic equation, so that it has equal roots.
  $Kx(x - 2) + 6 = 0$
* Find the roots of the following quadratic equation by the method of completing the square.
  $2x^2 + x - 4 = 0$
* Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill in the tank.
* Find the roots of the quadractic equation $2x^2 - 7x + 3 = 0$ by appliying the quadratic formula.
* Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. Find the Rohan's present age.
* Find two numbers whose sum is 27 and product is 182.
* The sum of the reciprocals of Rehman's ages (in years) 3 years ago and 5 years from now is $\frac{1}{3}$. Find his present age.
* The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.
* The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers.

Q.12. Find the roots of the equation $5x^2 - 6x - 2 = 0$ by the method of completing the square. (6)

Or

The product of two consecutive positive integers is 306. find the integers.

* Find two numbers whose sum is 27 and product is 182.
* A train travels a distance of 480 km at a uniform speed. If the speed had been 8km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train.

* Find the values of k for each of the following quadratic equations, so that they have two equal roots.

(i) $2x^2 + kx + 3 = 0$

(ii) $kx(x-2) + 6 = 0$

* Find the roots of the quadratic equation $2x^2 - 7x + 3 = 0$ by the method of completing the square.

* Find two consecutive odd positive integers, sum of whose squares is 290.

* Find the roots of the equation $5x^2 - 6x - 2 = 0$ by applying the completing formula.

* Find the roots of the quadratic equation $2x^2 - x + \frac{1}{8} = 0$ by factorisation.

* Find the roots of the quadratic equation $4x^2 + 4\sqrt{3}x + 3 = 0$ by the method of completing the square.

* A train travels 360 km at a uniform speed. If the speed has been 5km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Q.13. E and F are point on the sides PQ and PR respectively of PQR where PE = 3.9 cm, EQ = 3 cm, PF = 3.6 cm and FR = 2.4 cm. Prove that EF || QR. (6)

Or

If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side. Prove it.

* Altitudes AD and CE of ABC intersect each other at the point 'P' show that:

(i) AEP ~ CDP

(ii) ABD ~ CBE

* If AD and PM are medians of triangle ABC and PQR, respectively where $\Delta ABC \sim \Delta PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

* Diagonals of a trapezium ABCD with AB || DC intersect each other at the point O. If AB = 2CD, find the ratio of the areas of triangles AOB and COD.

* In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. Prove it.

* If the areas of two similar triangles are equal, prove that they are congruent.

* Prove that the ratio of the areas of two similar triangles, is equal to the ratio of square of their corresponding sides.

* If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Prove it.

Q.14. In an equilateral triangle ABC, D is a poit on side BC such that $BD = \frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$. (6)

Or

ABC is an equilteral triangle of side 2a. Find its altitude.

* A ladder is placed against a wall such that its foot is at a distance of 2.5 m from the wall and its top reaches a window 6 m above the ground. Find the length of the ladder.

* D and E are points on the sides CA and CB respectively of a triangle ABC right angled at Prove that
$AE^2+BD^2 = AB^2+DE^2$.

* ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

* D, E and F are respectively the mid points of sides AB, BC and CA of ΔABC. Find the ratio of the areas of ΔDEF and ΔABC.

* The diagonal of a quadrilateral ABCD intersect each other at the point O, such that $\frac{AO}{BO} = \frac{CO}{DO}$. Show that ABCD is a trapezium.

* Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

Q.15. Find the area of a triangle formed by the points A (2, 3), B (–1, 0) and C (2, –4). (6)

Or

Find the co-ordinates of a point A, where AB is the diameter of a circle whose centre is (2, –3) and B is (1, 4).

* If (1. 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

* Find the value of 'k' for which the points (8, 1), (k – 4) and (2, – 5) are collinear.

* Find the co-ordinates of the point which divides the join of (-1,7) and (4,-3) in the ratio 2:3.

* Find the ratio is which the line segment joining the points (–3, 10) and (6,–8) is divided by (–1, 6).

* If A(–5,7), (–4, –5), C(–1, –6) and D(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD.

* Find the coordinates of the points of trisection of the line segment joining (4, –1) and (–2, –3).

* Find the value of k if the points A(2, 3), B(4, k) and C(6, –3) are collinear.

* Find the relation between x and y such that the point (x, y) is equidistant from the point (3,6) and (–3, 4).

* Find the value of k if the points (7, –2), (5, 1) and (3, k) are collinear.

Q.16. If sin A = , calculate cos A and tan A. (6)

Or

If $\cot\theta = \frac{7}{8}$, evaluate $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta}$.

* Prove the identity $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$

* Given $\sec\theta = \frac{13}{12}$. Calcuate all other trignometric ratios.

* If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$; $0° < (A+B)\ 90°$; A > B, find A and B.

* Express the trigonometric ratios sin A, sec A and tan A in terms of cot A.

* Evaluate: $\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$

* If triangle ABC, right-angled at B, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of

(i) sin A cos C + cos A sin C

(ii) cos A cos C – sin A sin C.

* If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$; $0° < A+B \leq 90°$, a>B, find A and B.

* Given 15 cot A = 8. Find sin A and sec A.

* If $\sin(A-B) = \frac{1}{2}$, $\cos(A+B) = \frac{1}{2}$; $0° < A+B \leq 90°$, a>B, find A and B.

Q.17. The shadow of a tower standing on a level ground is found to be 40 m longer. when the sun's altitude is 30° than when it is 60°. Find the height of the tower.

Or

Evalute:

(i) $\dfrac{\sin^2 63° + \sin^2 27°}{\cos^2 17 + \cos^2 73°}$

(ii) $\sin 25° \cos 65° + \cos 25° \sin 65°$ (7)

* Prove that: $\dfrac{\tan\theta}{1+\cot\theta} + \dfrac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta \operatorname{cosec}\theta$.

* A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8m. find the height of the tree.

* Prove that: $\dfrac{\cos A - \sin A + 1}{\cos A + \sin A + 1} = \operatorname{cosec} A + \cot A$,

using the identify $\operatorname{cosec}^2 A = 1 + \cot^2 A$.

* An observer 1.5m tall is 28.5m away from a Chimney. The angle of elevation of the top of the Chimney from her eyes is 45°. What is the height of the Chimney?

* Prove that: $\dfrac{\cos A}{1+\sin A} + \dfrac{1+\sin A}{\cos A} = 2\sec A$.

* A kite is flying at a height of 60 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of string. assuming that there is no slack in the string.

* The angle of depression of the top and the bottom of 8 m tall building from the top of a multi-storeyed building are 30° and 45° respectively. Find the height of the multi-storeyed building and the distance between the two buildings.

* The angle of elevation of the top of the building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high, find the height of the building.

* A tree breaks due to storm and the broken part bends. So that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8m. Find the height of the tree.

* From the top of a 7 m high building, the angle of elevation of the top of cable tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower.

* A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building?

* From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45°, respectively. If the bridge is at a height of 3 m from the banks, find the width of the river.

* From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45°and 60° respectively. Find the height of the tower.

* Two tangents TP and TQ are drawn to a circle with centre O from an external point. Prove that:

  $\angle PTQ = 2\angle OPQ$.

* Prove that the tangents drawn at the end of a diameter of a circle are parallel.

* Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.

* Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

* Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre.

Q.18. Prove that the parallelogrm circumscribing a circle is a rhombus. (7)

Or

Prove that the lenghts of tangents drawn from an external point to a circle are equal.

* If tangents PA and PB from a point 'P' to a circle with centre 'O' are inclined to each other at angle of 80°, find POA.

* Draw a circle of radius 6 cm. From a point 10 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

* Draw a triangle ABC with sideBC = 6cm, AB = 5cm and $\angle ABC = 60°$. Then, construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the triangle ABC.

* Construct a triangle of sides 4 cm, 5 cm and 6 cm and then a triangle similar to it whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.

* Construct a triangle with sides 5 cm, 6 cm and 7 cm and then another triangle sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

Q.19. Draw a triangle ABC with side BC = 7 cm, B = 45°, A = 105°. Then construct a triangle whose sides are times the corresponding sides of a ABC. (Write the steps of construction). (7)

Or

Draw a circle of radius 6 cm. From a point 10 cm away from the centre. construct the pair of tangents to the circle and measure their lenghts. (write the steps of construction)

Q.20. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy. (7)

Or

A cap is shaped like the frustum of a cone. If its radius on the open side is 10 cm radius at the upper base is 4 cm and its slant height is 15 cm. Find the area of material used for making it.

* A solid is in the shape of a cone standing on a hemispher with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of .

* A cyclindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. This bucket is emptied on the ground and a concial heap of sand is formed. If the height of the conical heap is 24 cm, find the radius of the heap.

* A fez, the cap used by the Turks, is shaped like the frustum of a cone. If its radius on the open side is 10 cm, radius at the upper base is 4 cm and its slant height is 15 cm, find the area of material used for making it.

* A metallic sphere of radius 4.2 cm is melted and recast into the shape of cylinder of radius 6 cm. Find the height of the cylinder.

* Metallic spheres of radii 6 cm, 8 cm and 10 cm, respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.

* The slant height of a frustum of a coe is 4 cm and the perimeters (circumference) of its circular ends are 18 cm and 6 cm. Find the curved surface area of the frustum.