SJ Sample Paper
SSLC 2021

Mathematics

Time :2hours 30 minutes
Maximum Marks 80

Questions
Answers

- ⋆ Half of the questions carry full marks
- ⋆ Marks are specified along with the questions

Questions from 1 to 5 carry one mark each.(Choose the correct answer from the bracket)

1) An arithmetic sequence has the algebraic form $3n - 2$.Which of the following is its common difference?

(a) 1 (b) -2 (c) 3 (d) -1

Answer

Algebraic form of an arithmetic sequence is the form $an + b$.
a , the coefficient of n is the common difference.
$d = 3$

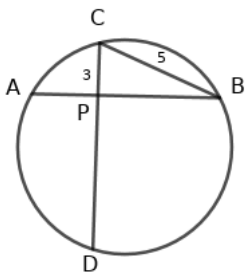
2) How many odd numbers from in the order makes the sum 900?

(a) 100 (b) 30 (c) 70 (d) 51

Answer

Sum of the first n odd numbers is n^2.
$n^2 = 900 \rightarrow n = 30$

3) In the figure AB and CD are perpendicular chords.These chords intersect at P inside the circle.If $PC = 3, BC = 5, PA = 9$ then what is the length PD



(a) 10 (b) 12 (c) 7 (d) 5

Answer

In $\triangle CPB, \angle P = 90°, PB = \sqrt{5^2 - 3^2} = 4$
$PA \times PB = PC \times PD \rightarrow 9 \times 4 = 3 \times PD$
$PD = 12$cm

4) Sum of a number and its square is 30. Which of the following is the number?

(a) 4 (b) -4 (c) 6 (d) -6

Answer

$-6 + (-6)^2 = -6 + 36 = 30$
In the options -6 is the answer.

5) In a polynomial $p(x) = ax^2 + bx + c$,if $a + b + c = 0$ then which of the following is definitly a factor

(a) $x + 1$ (b) $x - 1$ (c) x (d) $2x - 1$

Answer

If $x - 1$ is a factor $p(1) = 0.P(1)$ is $a + b + c$.In the question $a + b + c =\rightarrow x - 1$ is a factor.

Questions from 6 to 10 carry two score each.

6) Area of a rectangle is 221 sq.cm. The length of one side is 4cm more than the length of other side.

a) If the small side is x then write the equation connecting sides and area.

b) What are the sides of the rectangle?

Answer

a) Sides are x and $x + 4$.
$x(x + 4) = 221, x^2 + 4x = 221$

b) Complete the square on both sides. $x^2 + 4x + 4 = 221 + 4 = 225$
$(x + 2)^2 = 225, x + 2 = 15, x = 13.$
Sides are 13cm,17cm

7) Each letters of the word $MALAYALAM$ are written in small paper pieces and placed in a box.One is taken from the box without looking into the box

a) What is the probability of getting the letter A?

b) What is the probability of not getting the leter A?

Answer

a) There are 9 letters in the word and A repeats 4 times. Probability of getting the letter A is $\frac{4}{9}$

b) There are 5letters not A. Probability of getting a letter not A is $\frac{5}{9}$

8) In triangle ABC all sides are equal and the perimetre is 36cm

a) What is the length of a side?

b) What is the altitude of the triangle?

Answer

a) $a = \frac{36}{3} = 12$cm

b) Draw a rough diagram . If AD is the altitude then $\triangle ADB$ is a $30° - 60° - 90°$ triangle.
Side opposite to $30°$ is 6. So $h = 6\sqrt{3}$cm

9) $OABC$ is a rectangle with O the origin of coordinates,$A(4, 0)$ and $C(0, 3)$.

a) Write the coordinates of B.

b) Calculate the area of the rectangle $OABC$

Answer

a) $B(4, 3)$

b) $OA = 4, OB = 3$. Area $= 4 \times 3 = 12$ sq.unit

10) Base area of a wooden cylindrical block is 100π cm^2 and height 24cm. A cone of maximum size is carved from it.

a) What is the slant height of the cone so formed?

b) Find curved surface area of this cone.

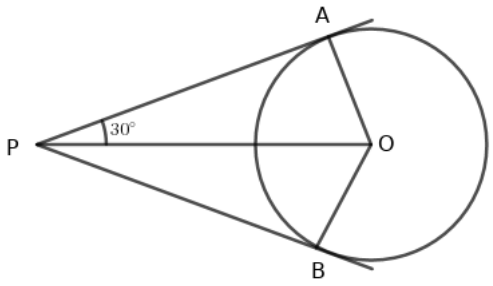
Answer

a) $\pi r^2 = 100\pi \to r^2 = 100, r = 10$cm
$l = \sqrt{10^2 + 24^2} = \sqrt{676} = 26$cm

b) Curved surface area $= \pi rl = \pi \times 10 \times 26 = 260\pi$ sq.cm

Questions from 11 to 20 carry three score each.

11) In the figure O is the centre of the circle , PA, PB are the tangents to the circle from P and $\angle OPA = 30°$



a) What is the measure of $\angle APB$?

b) What is the measure of $\angle AOB$?

c) If the radius of the circle is 3cm then what is the langth of the tangent?

Answer

a) $\angle APB = 60^\circ$

b) Since $OAPB$ is cyclic , $\angle AOB = 180 - 60 = 120^\circ$

c) $\triangle OAP$ is a $30^\circ - 60^\circ - 90^\circ$ triangle .Side opposite to 30° is the radius 3cm. Side opposite to 60° is the length of tangent. It is $3\sqrt{3}$cm

12) $A(1, 2)$ and $B(5, 8)$ are two points on a line and M is the mid point of AB.

a) What is the slope of this line?

b) What is the slope of another line parallel to the line passing through A and B

c) Write the coordinates of the mid point of the line AB.

Answer

a) Slope $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-2}{5-1} = \frac{6}{4} = \frac{3}{2}$

b) Slope of parallel lines are equal.So slope is $\frac{3}{2}$

c) $M(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}) = M(3, 5)$

13) Draw an equilateral triangle of side whose vertices are on a circle of radius 3cm.

Answer

⋆ Draw a circle of radius 3cm, centre O

⋆ Divide the angle around the centre as $120^\circ - 120^\circ - 120^\circ$ by radii

⋆ Join the ends of the radii on the circle which makes the required triangle.

14) The difference between the 5^{th} term and 8^{th} term of an arithmetic sequence is 24.

a) What is the common difference of this sequence?

b) What is the difference between 8 th term and 12 th term of this sequence .

c) If the 20th term is A then what is its 27 th term?

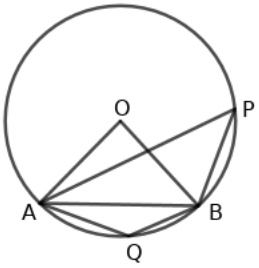
Answer

a) $3d = 24 \rightarrow d = 8$

b) The difference between 8 th term and 12 th term is $4d$. It is $4 \times 8 = 32$

c) 27 th term is $A + 7 \times d = A + 7 \times 8 = A + 56$

15) In the figure OAB is an equilateral triangle.O is the centre of the circle and P, Q are the points on the circle.



a) What is the measure of $\angle AOB$?

b) What is the measure of $\angle APB$?

c) What is the measure of $\angle AQB$?

Answer

a) $\angle AOB = 60^\circ$

b) $\angle APB = \frac{60}{2} = 30^\circ$

c) $\angle AQB = 180 - 30 = 150^\circ$

16) Area of a triangle is 144 square cm. One side is 2 cm more than the altitude to that side.

a) If the side of the triangle is x then what is the altitude to the side?

b) Form a second degree equation using the given information.

c) Calculate the length of the side and altitude to the side by solving the equation.

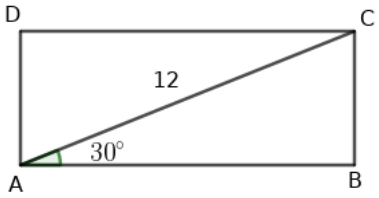
Answer

a) Altitude $= x - 2$

b) $\frac{1}{2} \times x \times (x-2) = 144, x^2 - 2x = 288$

c) Complete the square on both sides . For this add 1, the square of half of the coefficient of x on both sides.
$x^2 - 2x + 1 = 289$ $(x-1)^2 = 289, x - 1 = 17, x = 18$
Langth of the side is 18cm and altitude 16cm

17) The diagonal of the rectangle $ABCD$ is 12cm , $\angle BAC = 30^\circ$



a) What is the length of the side AB?

b) What is the length of the side BC?

c) Calculate the area of the rectangle

1+1

Answer

a) $\triangle ABC$is a $30^\circ - 60^\circ - 90^\circ$ triangle.
Side opposite to 90° is 12cm
Side opposite to 30° is 6cm $AB = 6\sqrt{3}$cm

b) $BC = 6$cm

c) Area $= AB \times BC = 36\sqrt{3}$sq.cm

18) In $\triangle ABC$, $A(-1,2), B(7,2), C(5,5)$

a) Which side of the triangle is parallel to x axis?

b) What is the length of the side parallel to x axis and altitude to that side?

c) Calculate the area of the triangle.

Answer

a) AB is parallel to x axis

b) $AB = |\ 7 - ^{-}\ 1\ | = 8$. Altitude $= |\ 5 - 2\ | = 3$

c) Area $= \frac{1}{2} \times 8 \times 3 = 12$ sq.unit

19) Draw a circle of radius 3cm. Mark a point P at the distance 7cm from the centre of the circle.Draw tangents to the circle from P.

Answer

⋆ Draw the circle, mark the centre and the point P.

⋆ Join OP, mark its mid point by drawing perpendicular bisector of OP as M and then draw a circle with M as the centre and radius OP.

⋆ This circle intersect the first circle at A and B. Join PA and PB. These are the tangents from P to the circle.

20) A sectoral sheet of central angle 120° is taken from a circular sheet of area 900πsq.cm. It is rolled in the shape of a cone.

a) What is the curved surface area of the cone so formed?

b) Find the slant height of the cone?

c) Find the radius of the cone?

Answer

a) Since central angle is $\frac{1}{3}$ of 360°, area is also $\frac{1}{3}$ the area of the circle. So area of the sector is $\frac{900}{3}\pi = 300\pi$. Curved surface area of the cone $= 300\pi$sq.cm

b) Radius of the circle or sector becomes the slant height of the cone.
$\pi R^2 = 900\pi, R^2 = 900, R = 30$. Slant height $l = R = 30$cm

c) $lx = 360r \rightarrow 30 \times 120 = 360 \times r, r = \frac{30 \times 120}{360} = 10$cm

Questions from 21 to 30 carry four score each.

21) There is a line passing through two points $(1, 2), (3, 4)$.

a) What relationship you observe between the x coordinates and y coordinates of these points?

b) What is the slope of the line passing through these points ?

c) What are the coordinates of the point where this line cut x axis ?

d) What are the coordinates of the point where this line cut y axis ?

Answer

a) y coordinates is 1 more than x coordinates (or) $y = x + 1$

b) Slope $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-2}{3-1} = \frac{2}{2} = 1$

c) $(-1, 0)$

d) $(0, -1)$

22) $p(x) = 3x^2 + 4x + 1$ is a polynomial.

a) Find $p(1)$

b) Calculate $p(x) - p(1)$

c) Check whether $x - 1$ a factor of $p(x) - p(1)$ or not

d) What integer should be added to $p(x)$ to get a polynomial in which x is a factor.

Answer

a) $p(1) = 3 \times 1^2 + 4 \times 1 + 1 = 3 + 4 + 1 = 8$

b) $p(x) - p(1) = (3x^2 + 4x + 1) - 8 = 3x^2 + 4x - 7$

c) When $x = 1, p(x) - p(1) = 3 + 4 - 7 = 0$
$x - 1$ is a factor of $p(x) - p(1)$

d) -1 should be added we get $3x^2 + 4x$, which has x a factor.

23) Atmospheric temperature of seven days in Ernakulam city is listed below.

$$26^\circ C, 28^\circ C, 25^\circ C, 24^\circ C, 24^\circ C, 30^\circ C, 28^\circ C$$

a) Arrange the data in the ascending order.

b) What is the median temperature?

c) How many days are there above median temperture?

d) How many temperatures are there above median temperture?

Answer

a) $24^\circ C, 24^\circ C, 25^\circ C, 26^\circ C, 28^\circ C, 28^\circ C, 30^\circ C$

b) median temperature is 26°

c) 3 days

d) 2 temperatures $(28^\circ C, 30^\circ C)$

24) $\frac{3}{7}n + 1$ is the algebraic form of an arithmetic sequence.By giving the values $1, 2, 3 \cdots$ to n we get the terms of the sequence.

a) What is the smallest value of n which gives an integer term of this sequence?

b) Write the integer terms as another sequence.

c) How many integer terms are there below 100

d) Calculate the sum of all integer terms below 100.

Answer

a) $n = 7$

b) Give $n = 7, 14, 21 \cdots$ we get the integer terms $4, 7, 10 \cdots$

c) All terms gives the remainder 1 on dividing by common difference 3 in the sequence of integer terms. So 97 is the term just below 100.
$3n + 1 < 100 \rightarrow 3n < 99, n < 33$. There are 32 terms below 100

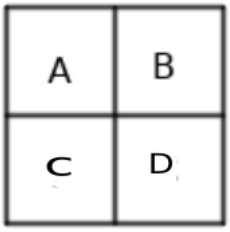
d) Sum $= (x_1 + x_n) \times \frac{n}{2} = (4 + 97) \times \frac{32}{2} = 101 \times 16 = 1616$

25) Draw a rectangle of sides 5 cm and 3 cm. Costruct a square having the area equal to the area of the rectangle.

Answer

- ⋆ Draw a rectangle of sides 5 cm and 3cm (say $ABCD$)
- ⋆ Produce AB to E such that $BC = BE$.Draw a semicircle with AE as the diametre.
- ⋆ Produce BC , it intersect the semicircle at P.
- ⋆ Draw a square with side BP. The area of the square is BP^2.It is equal to $BA \times BE = BA \times BC$ the area of the rectangle $ABCD$

26) In the grid given below the letters representing day numbers of a calandar.



a) If $A = x$ then write B, C and D.
b) If $A \times D = 84$ form a second degree equation.
c) Find A
d) Write the numbers B, C and D

Answer

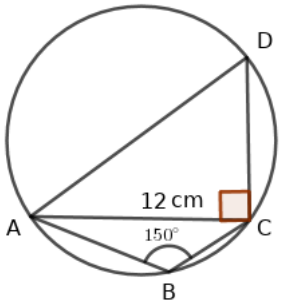
a) $B = x + 1, C = x + 7, D = x + 8$

b) $x(x + 8) = 84, x^2 + 8x = 84$

c) $x^2 + 8x + 4^2 = 84 + 4^2$
$(x + 4)^2 = 100, x + 4 = \sqrt{100}, x = 10 - 4 = 6$
$A = 6$

d) $A = 6, B = 7, C = 13. D = 14$

27) The circle shown in the figure is the circumcircle of $\triangle ABC$ as well as $\triangle ACD$.$\angle ACD = 90°, AC = 12$cm , $\angle ABC = 150°$



a) What is the measure of $\angle ADC$?
b) What is the radius of the circle.
c) Find the length of CD
d) Calculate the area of $\triangle ACD$.

Answer

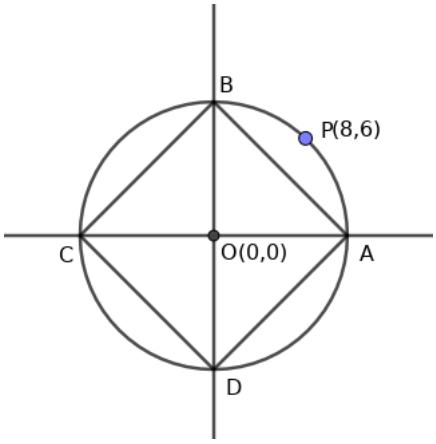
a) Since $ABCD$ is cyclic, $\angle ADC = 180 - 150 = 30^\circ$

b) Since $\angle ACD = 90^\circ$ we can say AD is the diametre of the circle
$\triangle ACD$ is a $30^\circ - 60^\circ - 90^\circ$ triangle.
$AD = 24$cm. Radius of the circle is 12cm

c) $CD = 12\sqrt{3}$cm

d) Area $= \frac{1}{2} \times 12 \times 12\sqrt{3} = 72\sqrt{3}$ sq.cm

28) A circle is drawn with centre at the origin.It cuts the axes at A, B, C and D. If $P(8, 6)$ is a point on the circle.



a) Find the radius of the circle.

b) What are the coordiantes of $A, B, C$and D

c) Find the area of the square $ABCD$

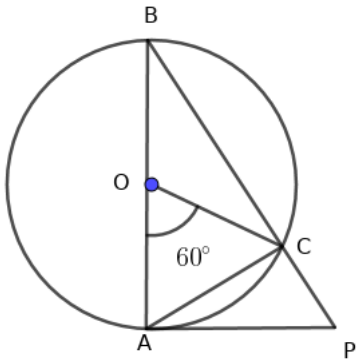
Answer

a) Radius $r = \sqrt{8^2 + 6^2} = 10$

b) $A(10, 0), B(0, 10), C(-10, 0), (0, -10)$

c) $AB = 10\sqrt{2}$. Area of the square $ABCD = (10\sqrt{2})^2 = 100 \times 2 = 200$sq.unit

29) In the figure AB is the diametre of the circle, O is the centre of the circle and PA is a the tangent at A .Also, $PA = 4$cm and $\angle AOC = 60^\circ$.



a) What is the measure of $\angle ABC$?

b) What are the angles of $\triangle ABC$?

c) What is the length PC.

d) What is the length PB

Answer

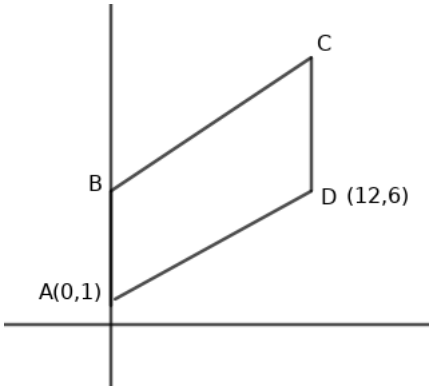
a) $\angle ABC = \frac{1}{2} \times 60 = 30°$

b) Since AB is the diametre of the circle $\angle ACB = 90°$.$\angle BAC = 60°$. Angles are $30°, 60°, 90°$

c) $\triangle PCA$ is also a $30° - 60° - 90°$ triangle. Side opposite to $90°$ is 4cm . So $PC = 2$cm

d) In $\triangle ABP$, side opposite to $30°$ is 4. Therefore $PB = 8$cm

30) In the figure $ABCD$ is a parallelogram.Two vertices A and B are on y axis.$A(0, 1)$ and $D(12, 6)$ Also, the diagonal BD can divide the parallelogram into two equal right triangles.



a) What are the coordinates of B

b) Write the coordinates of C

c) What is the length of parallel sides AB and CD

d) Find the perimetre of the parallelogram.

Answer

a) $B(0, 6)$

b) $C(x, y)$. $x = 6 + 12 - 0, y = 0 + 6 - 1$
$C(18, 5)$

c) $AB = \mid 6 - 1 \mid = 5, CD = 5$

d) $AD = \sqrt{5^2 + 12^2} = 13$
Perimetre $= 13 + 13 + 5 + 5 = 36$

Questions from 31 to 45 carry five score each.

31) $1^{st}, 3^{rd}, 5^{th} \cdots$ terms of an arithmetic sequence are $7, 15, 23 \cdots$.

a) Insert $2^{nd}, 4^{th}, 6^{th} \cdots$ terms and write the sequence completly

b) Write the algebraic form of the sequence.

c) What is the 15 th term of an arithmetic sequence?

d) What is the sum of first 29 terms of the sequence?

e) Can the sum of any 25 terms of this sequence 2020? How can you realise it?

Answer

a) $2d = 15 - 7 = 8, d = 4$
Sequence is $7, 11, 15, 19 \cdots$

b) $x_n = dn + (f - d) = 4n + (7 - 4) = 4n + 3$

c) $x_{15} = 4 \times 15 + 3 = 63$

d) Sum $= 29 \times x_{15} = 29 \times 63 = 1827$

e) All terms are odd numbers. Some of 25 odd numbers cannot be an even number. 2020 cannot be the sum .

32) The angles of a quadrilateral are $\angle A = x, \angle B = 4x, \angle C = 4x + 30, \angle D = 2x$

a) Find x

b) What are the angles of $ABCD$?

c) What is the position of B and D based on the circle with diametre AC?

d) The diagonals AC and BD intersect at P inside the circle. Write the relation between the segments PA, PB, PC and PD

e) Can any one of the diagonals be the diametre of the circle passing through the vertices.

Answer

a) Angle sum of a quadrilateral is $360°$.$x + 4x + 4x + 30 + 2x = 360$,
$11x + 30 = 360, 11x = 330, x = 30$.

b) Angles are $\angle A = 30°, \angle B = 4 \times 30 = 120°, \angle C = 150°, \angle C = 60°$

c) Since $\angle A < 90°$, A is outside the circle with diametre BC.
Since $\angle C > 90°$, C is inside the circle with diametre BC.

d) Opposite angle sum of $ABCD$ is $180°$. So $ABCD$ is cyclic. A circle can be drawn through all of its verices. So AC and BD are the diagonals of $ABCD$.
The diagonals intersect at P.
$PA \times PC = PB \times PD$

e) None of the angles is a right angle. That is diagonal cannot be the diametre.

33) Area of a right angled triangle is 216 square cm.One of the perpendicular sides is 6 more than the other.

a) If the smallest side is x then what is the side perpendicular to it?

b) Form a second degree equation connecting perpendicular sides and area .

c) Find the perpendicular sides of the triangle.

d) Find the hypotenuse of the triangle.

Answer

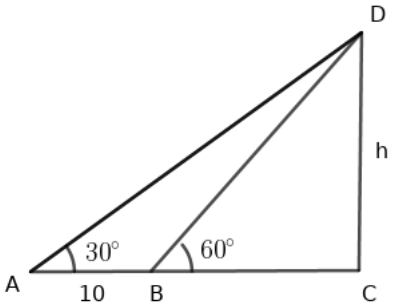
a) $x + 6$

b) $\frac{1}{2} \times x(x + 6) = 216, x^2 + 6x = 432, x^2 + 6x + 9 = 441$

c) $(x + 3)^2 = 441, x + 3 = 21, -21$
$x + 3 = 21 \to x = 18$
$x + 3 = -21, x = -24$. Perpendicular sides are 18 cm and $18 + 6 = 24$cm .

d) Hypotenuse $= \sqrt{18^2 + 24^2} = \sqrt{900} = 30$cm

34) From a point on the plane ground the top of a treeis viewed at an angle of elevation $30°$ marked in the figure.When moved 10metre towards the tree the angle of elevation becomes $60°$. This angle is also marked in the figure.



a) Calculate the distance from the second pont of observation to the foot of the tree

b) Find the height of the tree.

Answer

a) $\triangle BCD$ is a $30° - 60° - 90°$ triangle
If $BC = x$ and $CD = h$ then $h = \sqrt{3}x$
$\triangle ACD$ is a $30° - 60° - 90°$ triangle. $10 + x = \sqrt{3}h$
$10 + x = \sqrt{3} \times \sqrt{3}x$
$10 + x = 3x, 2x = 10, x = 5$metre.

b) $h = \sqrt{3}h = 5\sqrt{3}$metre.

35) $A(6, 1), B(8, 2), C(9, 4)$ are the three vertices of a parallelogram. E is the mid point of CD.

a) Write the coordinates of D

b) Find the length of its sides.

c) Find the coordinates of E

Answer

a) Let $D(x, y)$ be the fourth vertex.
AB is parallel to CD. The shift of x coordinates of A and B is 2, So $x = 9-2 = 7$
Taking the shift of y coordinates, $y = 3$. The vertex $D(7, 3)$

b) $AB = \sqrt{(8-6)^2 + (2-1)^2} = \sqrt{5}, CD = \sqrt{5},$
$AD = \sqrt{(7-6)^2 + (3-1)^2} = \sqrt{5}, BC = \sqrt{5}$

c) $E(\frac{9+7}{2}, \frac{4+3}{2})$. It is $E(8, \frac{7}{2})$

36) In the second degree polynomial $p(x), p(1) = 0, p(-2) = 0$.

a) What are the first degree factors of $p(x)$

b) Write a polynomial satisfying this condition.

c) What number should be added to the polynomial that you wrote to get another polynomial in which $x + 1$ a factor.

Answer

a) $x-1$ and $x+2$ are the factors.

b) $p(x)=(x-1)(x+2)=x^2+x-2$

c) Let k be the number to be added . The new polynomial is $q(x)=x^2+x-2+k$
$x+1$ is a factor of $q(x) \to q(-1)=0$
$(-1)^2+(-1)-2+k=0 \to k=2.$
2 should be added.

37) The daily wages of 200 workers in a factory are given below .

Wages	350	400	450	500	550	600
No. Workers	14	50	30	40	36	30

a) Prepare the table for calculating the median.

b) Find the median wage.

c) How many workers are getting median wage and below ?

d) How many workers are getting median wage and above ?

Answer

a) Table

wages	Number
350	14
400	64
450	94
500	134
550	170
600	200

b) $n=200$(even). So 100 th and 101st wage comes in the middle. From the table it is clear that wage of both 100 th and 101st worker is 500.Median is 500.

c) There are 94 workers having daily wage below 500.

d) There are 66 workers having wage above 500.

38) Look at the pattern given below

$$1^3=1$$
$$1^3+2^3=9=3^2=(1+2)^2$$
$$1^3+2^3+3^3=36=6^2=(1+2+3)^2$$

We can see an order in this calculaion. This will help us to write more lines below . Answer the following questions

a) How many cubic numbers are there from 1 to 8000?

b) Find $1^3+2^3+3^3+4^3$

c) Find the sum of the cubes of all natural numbers from 1 to 6

d) We know that the sum of all natural numbers from 1 to 10 is 55. Calculate $1^3+2^3+3^3\cdots 10^3$

e) Write a formula to find the sum $1^3 + 2^3 + 3^3 \cdots + n^3$

Answer

a) $20^3 = 8000$. There are 20 cubic numbers upto 8000

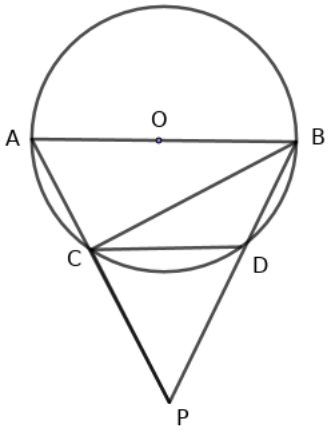
b) $(1+2+3+4)^2 = 10^2 = 100$

c) $(1+2+3+4+5+6)^2 = 21^2 = 441$

d) $55^2 = 3025$

e) $s_n = (\frac{n(n+1)}{2})^2$

39) AB is the diametre of the circle.CD is a chord of length equal to radius of the circle.



a) What is the measure of $\angle COD$?
b) What is the measure of $\angle CBD$?
c) What is the measure of $\angle DCP$?
d) Find the measure of $\angle CPD$

Answer

a) Draw OC, OD ,OCD is an equilateral traingle .$\angle COD = 60^\circ$

b) $\angle CBD = \frac{1}{2} \times 60 = 30^\circ$

c) $\angle BCP = 90^\circ$ (angle in the semicircle). $\therefore BCP = 90^\circ$.

d) In traingle BCP, $\angle CPD = `\angle CPB = 180 - (90+30) = 60^\circ$

40) The denominator of a fraction is 1 more than two times its numerator.The sum of the fraction and its reciprocal is $2\frac{16}{21}$.

a) If the numerator is x what is its denominator.
b) Write the fraction in x
c) Form a second degree equation using the given condition.
d) Find the fraction.

Answer

a) $2x+1$

b) Fraction is $\frac{x}{2x+1}$.

c) $\frac{x}{2x+1}+\frac{2x+1}{x}=2\frac{16}{21}$
$\frac{x}{2x+1}+\frac{2x+1}{x}=\frac{58}{21}$
$11x^2-26x-21=0$

d) Solving , $x=3$.
Fraction is $\frac{3}{2\times3+1}=\frac{3}{7}$

41) The base perimetre of a cone is 20π cm, slant height 18cm .It is made by rolling a sectoral sheet .

a) What is the radius of the sector?

b) What is the radius of the cone?

c) What is the central angle of the sector?

d) Find the lateral surface area of the cone?

Answer

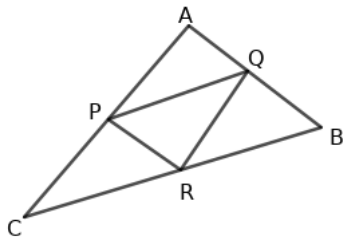
a) 18cm

b) $2\pi r=20\pi, r=10$cm

c) $lx=360r\rightarrow 18\times x=360\times 10, x=\frac{360\times10}{18}=200^\circ$

d) Curved surface area $\pi rl=180\pi$sq.cm

42) Triangle PQR is drawn by joining the mid points of the sides of triangle ABC.



a) How many equal triangles are there in the figure?

b) A fine dot is placed into the figure. What is the probability of falling the dot in triangle PQR?

c) How many parallelograms are there in the picture?

d) A fine dot is placed into the figure. What is the probability of falling the dot in the parallelogram $PQRC$?

e) What is the probability of not falling the dot in the parallelogram $PQRC$?

Answer

a) 4

b) $\frac{1}{4}$

c) 3

d) $\frac{2}{4}$. That is $\frac{1}{2}$

e) $\frac{1}{2}$

43) Consider the polynomials $p(x) = x^3 + 1$, $q(x) = x^3 + x^2 + x + 1$

a) Find $p(-1)$ and $q(-1)$

b) What is the factor common to both the polynomials

c) Find $r(x) = p(x) + q(x)$

d) what is the first degree factor of $r(x)$

Answer

a) $p(-1) = (-1)^3 + 1 = -1 + 1 = 0$
$q(-1) = (-1)^3 + (-1)^2 + (-1) + 1 = -1 + 1 - 1 + 1 = 0$

b) $p(-1) = 0, q(-1) = 0$ implies $(x - 1)$ is a factor of both .$(x - 1)$is the common factor

c) $r(x) = (x^3 + 1) + (x^3 + x^2 + x + 1) = 2x^3 + x^2 + x + 2$

d) $r(-1) = 2(-1)^3 + (-1)^2 + (-1) + 2 = -2 + 1 - 1 + 2 = 0$
$x + 1$ is the factor of $r(x)$

44) $P(2, -1), Q(3, 4), R(-2, 3), S(-3, -2)$ are the vertices of a quadrilateral.

a) Find the length of sides .

b) What is the length of its diagonals?

c) Suggest a suitable name to this quadrilateral.

d) Calculate the area .

Answer

a) $PQ = \sqrt{(3-2)^2 + (4+1)^2} = \sqrt{26}$
$QR = \sqrt{(-2-3)^2 + (3-4)^2} = \sqrt{26}$
$RS = \sqrt{(-3+2)^2 + (-2-3)^2} = \sqrt{26}$
$SP = \sqrt{(-3-2)^2 + (-2+1)^2} = \sqrt{26}$

b) Diagonals $PR = \sqrt{(-2-2)^2 + (3+1)^2} = 4\sqrt{2}$
$QS = \sqrt{(-3-3)^2 + (-2-4)^2} = 6\sqrt{2}$

c) $PQ = QR = RS = SP$
$PR \neq QS$ .This is a rhombus

d) Area $= \frac{1}{2} \times d_1 \times d_2 = 24$ sq.unit

45) Two angles of a triangle are 70° and 60°. A circle of radius 3cm touches its sides inside. Construct the triangle.

Answer

⋆ Draw a circle of radius 3cm

⋆ Draw three radii such that angle between them are $180 - 70 = 110^\circ, 180 - 60 = 120^\circ$

⋆ Draw tangents at the ends of the radii to the circles

⋆ Tangents make the triangle.

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