1   Chitra has drawn a cuboid. L, B, H are length, breadth and height respectively. She was trying to find the diagonal PQ. Help her to find PQ. Also find $tan\theta$ and $sin\theta$ in terms of L,B and H.
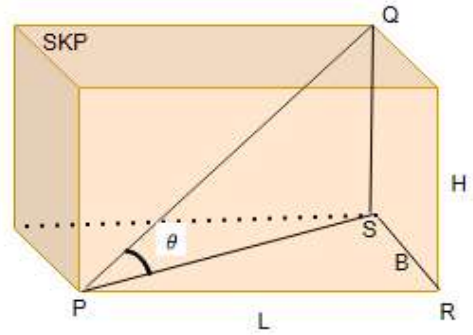
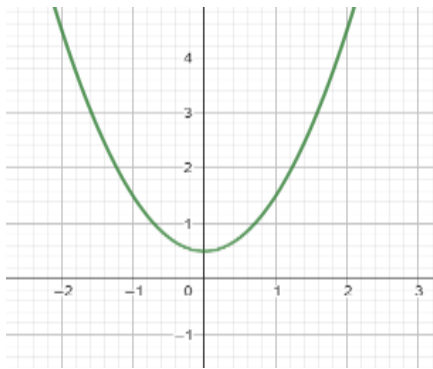ANS: PS $= \sqrt{L^2 + B^2}$. $PQ = \sqrt{L^2 + B^2 + H^2}$

$tan\theta = \dfrac{QS}{PS} = \dfrac{H}{\sqrt{L^2+B^2}}$.

$sin\theta = \dfrac{QS}{PQ} = \dfrac{H}{\sqrt{L^2+B^2+H^2}}$
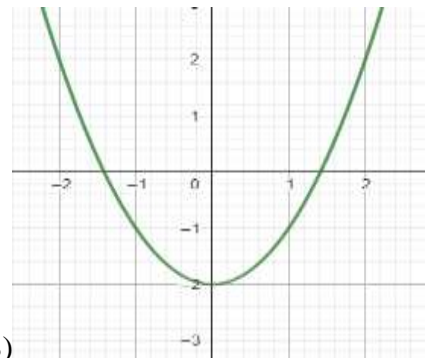
2   Devanshi solved a quadratic equation and found its roots to be real, which of these could represent the graph of the equation ?

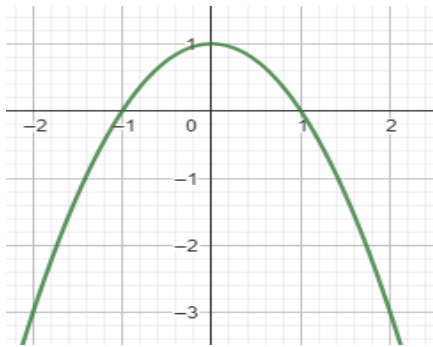(A) $only$ (i) (B) $only$ (i)& (iii) (C) $except$ (i) (D) $only$ (ii)&(iii)
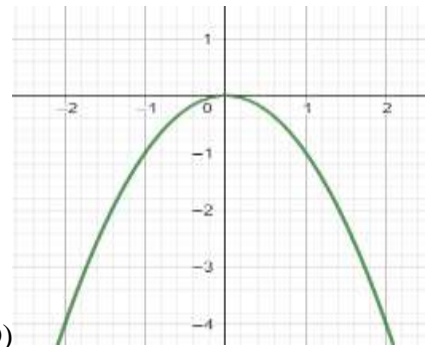
(A)

(B)

(C)

(D)

ANS: (C) $except$ (i)

3

Kush used the quadratic formula to solve a quadratic equation in y and got $y = \dfrac{8 \pm \sqrt{144}}{10}$. Write the quadratic equation.

ANS: $y = 2$, $y = -\dfrac{2}{5}$

Quadratic equation is $(y - 2)\left(y + \dfrac{2}{5}\right) = 0$ $\Rightarrow$ $(y - 2)(5y + 2) = 0$

$\Rightarrow 5y^2 - 8y - 4 = 0$

4 Aastha was playing with discs , and arranged some discs as shown in the figure. Discs are arranged in the sequence 1, 3, 5, 7, 9 , 11 _____ so on .
How many discs will be there in the 20th pillar?
Find the total number of discs from 1st pillar to 20th pillar.
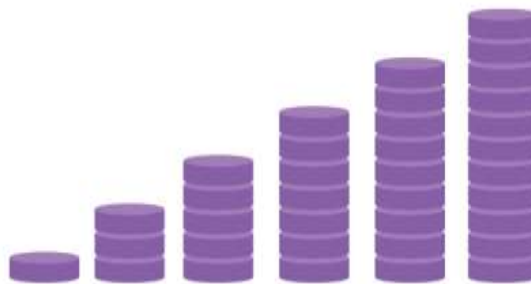
ANS: $a_{20} = a + (n - 1)d$
$\Rightarrow 1 + 19 \times 2 = 39$
$S_{20} = \frac{20}{2}\,(1 + 39) = 10 \times 40 = 400$, total number of discs $= 400$

5 Anvi plans to go on a cycle tour from Anand to Mumbai covering 425 km. she travels 20 km on day 1 and increases the distance covered each day by 5 km. in how many days will she reach her destination?

ANS: AP is 20 , 25,30, _____
$S_n = \frac{n}{2}\,(20 + (n - 1)5) = 425$
$850 = n(35 + 5n) \Rightarrow n^2 + 7n - 170 = 0 = (n + 17)(n - 10) = 0$
$n = 10,$ number of days $= 10$

6 $P(x) = (x + 3)^2 - 2\,(x - c),$ c is a constant . If $P(x)$ is divisible by x, find the value of c.
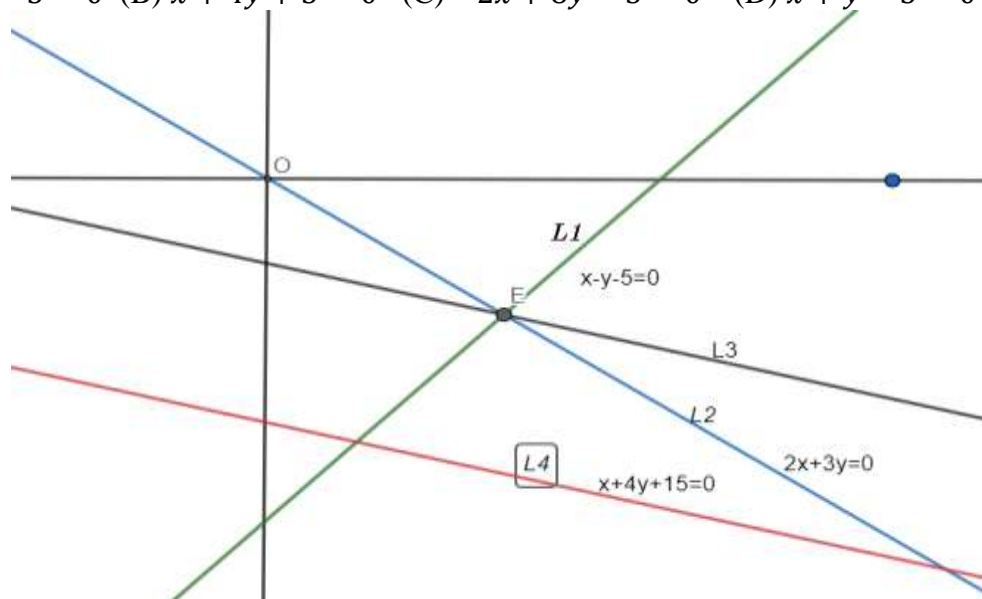ANS: $P(x) = (x + 3)^2 - 2\,(x - c)$
$P(0) = (0 + 3)^2 - 2\,(0 - c) = 0$
$\Rightarrow 9 + 2c = 0 \Rightarrow c = -\frac{9}{2}$

7 Jeet has drawn some lines as given below. It is given that lines L_1 , L_2 and L_3 intersect at exactly one point and line $L_3 \parallel L_4$.
Which one is the equation of L_3 ?
(A) $x + 4y - 5 = 0$ (B) $x + 4y + 5 = 0$ (C) $2x + 8y - 5 = 0$ (D) $x + y - 5 = 0$

ANS: (B) $x + 4y + 5 = 0$

8 Bhakti correctly solved a pair of linear equations in two variables and found their only point of intersection as $(1, -2)$. One of the lines was $x - y = 3$. Which of the following could have been the other line?
i) $x + y + 1 = 0$ ii) $2x + y = 1$ iii) $2x + y = 0$
(A) Only (i)   (B) Only (ii)   (C) (i)& (iii)   (D) (ii) and (iii)

9   Isika asked a question to Pankti.
    Given a part of graph of a polynomial $g(x)$.
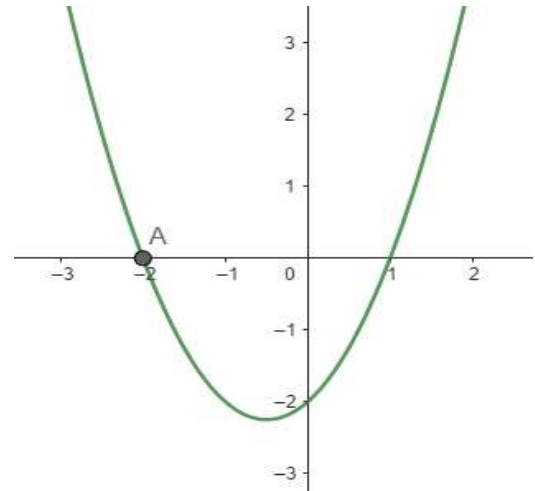   On dividing $g(x)$, Which of the following will the remainder be zero?
    i) $x - 2$
    ii) $x + 2$
    iii) $x - 1$
    iv) $x + 1$

    (A) i) & iii)   (B) i) & ii)
    (C) i) & iv)   (D) ii) & iii)
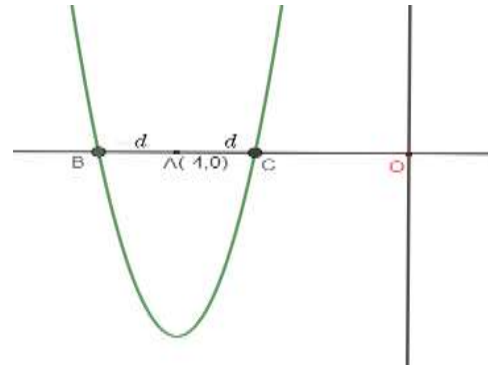
    ANS: (D) ii) & iii)

10 Akshat was trying to solve a question.
    Given the graph of quadratic equation $x^2 + kx + 12 = 0$.
    Without finding k, find the roots of the quadratic equation.
    Given, A is the mid-point of BC.
    Where $A(-4,0)$, $AB = -d$ and $AC = d$. O is the origin.

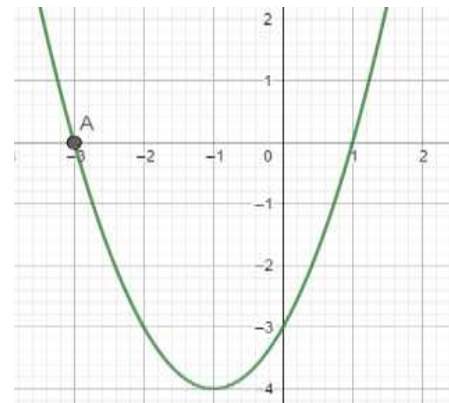   ANS: Product of the roots = 12
    Roots are $(-4 - d, -4 + d)$
    Product of the roots $= 12 = (-4 - d)(-4 + d)$
    $\Rightarrow 16 - d^2 = 12 \Rightarrow d^2 = 4 \Rightarrow d = \pm 2 \Rightarrow d = 2 \ (positive)$
    Roots are $(-4 - 2)$ & $(-4 + 2)$ ie $-6 \ and -2$

11 Jiya found the following question in a sample paper "Write a quadratic polynomial whose sum of zeros is less than that of the polynomial shown in the graph".
    Help her to find the solution.

    ANS: zeros of the quadratic polynomial are $-3 \ and \ 1$ Sum $= -2$
    quadratic polynomial is $x^2 + 3x + 4$ $(Sum = -3)$

12 The parking fees of a car at Anand Railway station is charged in two parts- a fixed charge of ₹ x for the first 4 hours and ₹ y for subsequent hours. Shivam parked his car for 6 hours and paid ₹ 70. Tulsi parked her car for 12 hours and paid ₹ 190.
    Frame linear equations representing the context and find the fixed charge and the subsequent charge per hour.
    Also, Dev parked his car at the station from 8 am to 3 pm. How much amount Dev has to pay?

    ANS: $x + 2y = 70$, $x + 8y = 190$
    $x = 40, y = 20$

Total amount = ₹ 90

13 Krisha had red, blue and yellow marbles in the ratio 4: 5: 3. She gave all her red marbles and some blue marbles to Meet. The ratio of the number of blue marbles and yellow marbles left with Krisha was 7: 9.
If Krisha gave 20 marbles to Meet , how many of them are red marbles?

Let the number of Red marbles = $4x$
the number of Blue marbles = $5x$
the number of Yellow marbles = $3x$
let the number of blue marbles given to Meet = y
$4x + y = 20$
$\frac{5x-y}{3x} = \frac{7}{9}$, $8x - 3y = 0$
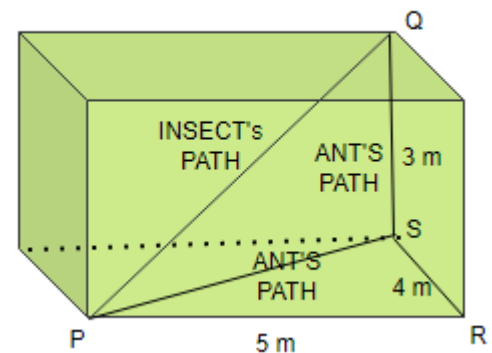Solve $x = 3, y = 8$
Red marbles gave to Meet = 20 – 8 = 12.

14 Umang found an insect is sitting at corner P of his room flies along PQ and reaches at Q. whereas an ant sitting at corner P , reaches corner Q through S , by crawling along path PS, followed by SQ.
i) Find the length of the path taken by ant.
ii) Find the distance travelled by insect

ANS; $PS = \sqrt{25 + 16} = \sqrt{41}$
length of the path taken by ant $= 3 + \sqrt{41}$ m
distance travelled by insect $=$ $PQ = \sqrt{41 + 9} = \sqrt{50}$ m

15 Vidhan and James are cycling on two roads represented by the equation $2x + 3y = 7\ and\ 4x + 6y = 12$. Will they meet at some point? Justify your answer.

ANS: $2x + 3y = 7\ and\ 4x + 6y = 12$.
Then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ Roads are parallel, they will not meet.

16 Harsh claimed that : If the sum of first n terms of an AP is $An + Bn^2$ where $A\ and\ B$ are constants, the common difference of AP will be 2A. Is it true? If false which of the following can be?
(A) $A + B$ (B) $A - B$ (c) $2A$ (d) $2B$
$S_n = An + Bn^2$
$S_1 = A \times 1 + B \times 1^2 = A + B$
$\because S_1 = a_1$
$\therefore a_1 = A + B$ ... (i)
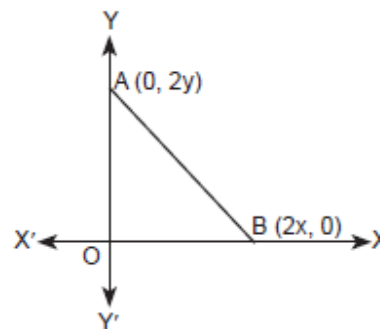and $S_1 = A \times 2 + B \times 2^2$
$\Rightarrow a_1 + a_2 = 2A + 4B$
$\Rightarrow (A + B) + a_2 = 2A + 4B$ [Using (i)]
$\Rightarrow a_2 = A + 3B$
$\therefore d = a_2 - a_1 = 2B$

17 The coordinates of the point which is equidistant from the
    three vertices of the Δ AOB as shown in the figure is_____

    (A) (x, y) (B) $(\frac{x}{2}, \frac{y}{2})$
    (C) $(0, 0)$ (D) $(2x, 2y)$

    ANS: AOB is a right triangle.
    ∴ Mid-point of AB is equidistant from A, O and B.
    Mid-point of AB = $\left(\frac{(0+2x)}{2}, \frac{(2y+0)}{2}\right) = (x, y)$

18 Het asked Ashish "At how many points does the graph of the expression $\frac{x^2 - 4\sqrt{2}x + 6}{(x-3\sqrt{2})}$, $x \neq$
    $3\sqrt{2}$ intersect on $x - axis$?" what could be Rachit's answer?

    ANS: $\frac{x^2 - 4\sqrt{2}x + 6}{(x-3\sqrt{2})} = \frac{(x-3\sqrt{2})(x-\sqrt{2})}{(x-3\sqrt{2})} = (x - \sqrt{2})$
    Intersect at one point on $x - axis$

19 Given below a linear equation $\frac{5(x-y)+3(x+y)}{x^2-y^2} = 14$, Riya has reduced to a linear equation with the
    following steps.
    Step -1 : $\frac{5(x-y)+3(x+y)}{(x-y)(x+y)} = 14$
    Step 2 : $\frac{5}{(x-y)} + \frac{3}{(x+y)} = 14$
    Step 3 : $let \quad u = \frac{1}{x-y}, \quad v = \frac{1}{x+y}$
    Step 4 : Equation is $5u + 3v = 14$

    There is an error occurred in the steps, identify which step error happened? Help her and write the
    correct steps.
    ANS: Step 2 : $\frac{5}{(x-y)} + \frac{3}{(x+y)} = 14$

     Correct step $\frac{5}{(x+y)} + \frac{3}{(x-y)} = 14$

20 Shreya threw a stone into a still water and the
    figure represents the concentric circles formation
    in the water. Radius of the first circle is $3\ cm$. If
    the radius of each subsequent circle is $4cm$
    more than the previous , which circle has a
    radius of 83 cm?

    ANS: $a = 3, d = 4$
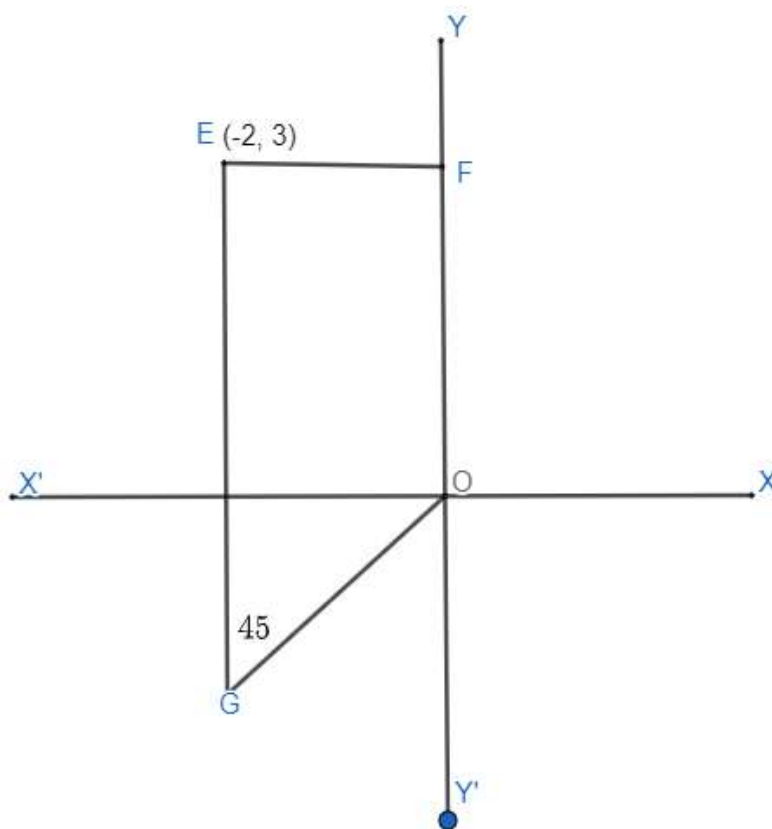 $a + (n - 1)d = 83$
    $3 + (n - 1)4 = 83$
    $n = 21$

21 Is it true that 10th term of any AP is double that of the 5th term?
    No

22 Priyanshi asked a question to Maahi "A quadrilateral OFEG is drawn on a co-ordinate grid as shown below. O is the origin and the co-ordinates of E are $(-2, 3)$. $\angle OGE = 45°$. Perimeter of quadrilateral OFEG is _____ units ." what is Maahi's answer?

ANS: $3 + 3 + 2 + 2 + 2\sqrt{2} = 10 + 2\sqrt{2}$

23 Madhav solved correctly the question "The line $x + 3y = 6$ intersect $x - axis$ at P and $y - axis$ at Q. find the co-ordinates of P and Q. Find the area of triangle OPQ." What is his answer?
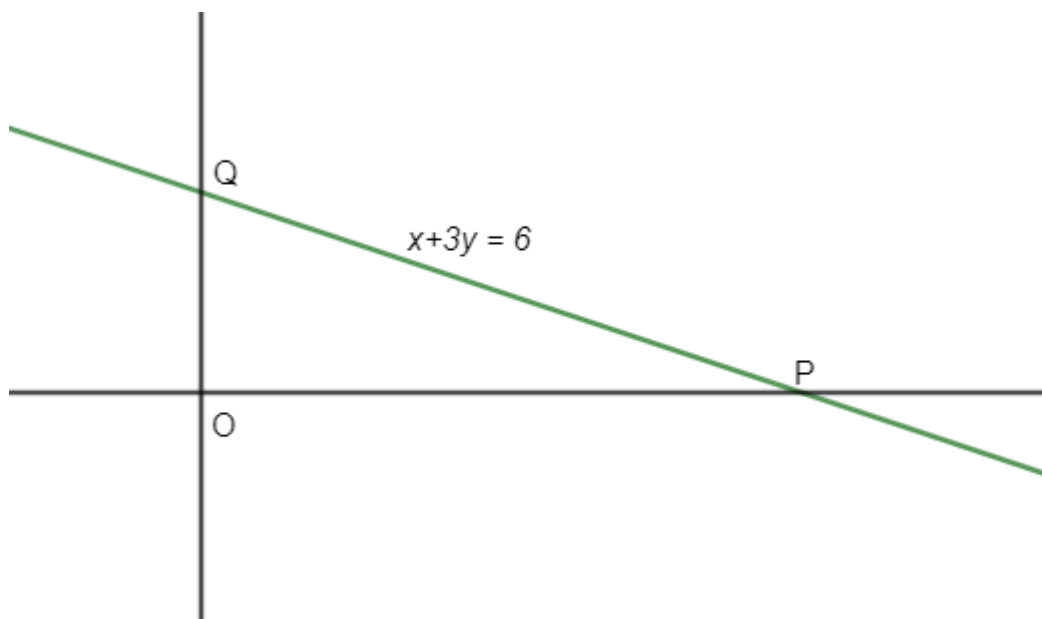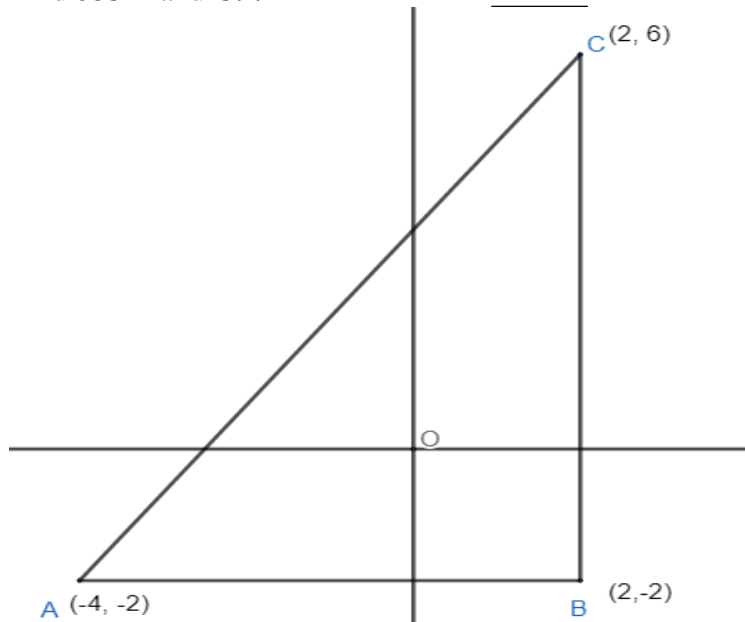

ANS: For co-ordinates of P, Put $y = 0$ then $x = 6$, P (6, 0)
        For co-ordinates of Q, Put $x = 0$ then $y = 2$ Q (0, 2)
$A = \frac{1}{2} \times 6 \times 2 = 6 \ sq. units$

24 Sakshi was asked to solve a question "In the figure, O is the origin and ABC is a right angled triangle.

Find $cosA$ and $sinA$" The answer is _____.
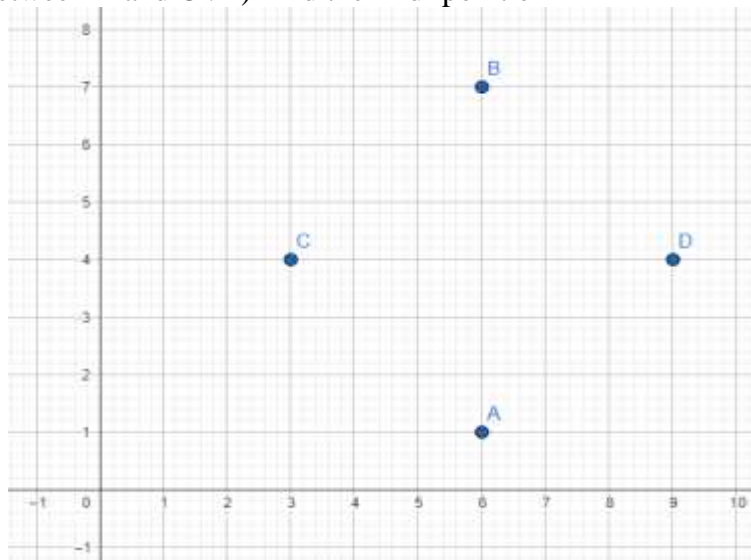

ANS: $AB = 6$, $BC = 8$ $AC = 10$, $\cos A = \frac{AB}{AC} = \frac{6}{10} = \frac{3}{5}$

$sinA = \frac{BC}{AC} = \frac{8}{10} = \frac{4}{5}$

25 Students A , B, C and D are standing in rows and columns in their playground for a game. A, B, C and D are the positions of four students as shown in the figure. Use the concepts of co-ordinate geometry to find the following.
i) Find the distance between B and C . ii) Find the mid- point of AD

ANS: B (6,7) , C (3,4) , A (6,1) D(9, 4)

(i) B C = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ = $\sqrt{(6-3)^2 + (7-4)^2} = \sqrt{(3)^2 + (3)^2} = \sqrt{18}$

(ii) Midpoint of AD = $\left(\frac{6+9}{2}, \frac{1+4}{2}\right)$ = $\left(\frac{15}{2}, \frac{5}{2}\right)$

26 Which of these is a quadratic equation having one of its roots as 0?
(A) $x^2 - 5 = 0$ (B) $x^3 + x^2 = 0$ (C) $x^2 - 7x = 0$ (D) $x(x-1)(x-2) = 0$
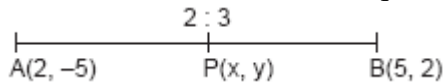ANS: (C) $x^2 - 7x = 0$

27 Point P divides the line segment joining the points A(2, –5) and B(5, 2) in the ratio 2 : 3. Name the quadrant in which P lies.
ANS:

$x = \frac{2 \times 5 + 3 \times 2}{2+3} = \frac{16}{5} = 3.2$

$y = \frac{2 \times 2 + 3 \times (-5)}{2+3} = -\frac{11}{5} = -2.2$

Point P(3.2, – 2.2) lies in IV quadrant

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              2 : 3
├─────────────┼─────────────┤
A(2, –5)    P(x, y)      B(5, 2)
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28 Zoya starts cycling from her home to a park. Instead of going to the park directly, she goes to her friend's house and both started cycling towards the park. After an hour, while coming back to her house she bought 2 packets of Amul gold milk.
Assume that all distances covered are in straight line.
If the house is situated at A (2, 3), friend's house at B (4, 5), park at C (7, 2) and Amul shop at (4, 2).
Using the concepts of coordinate geometry, answer the following
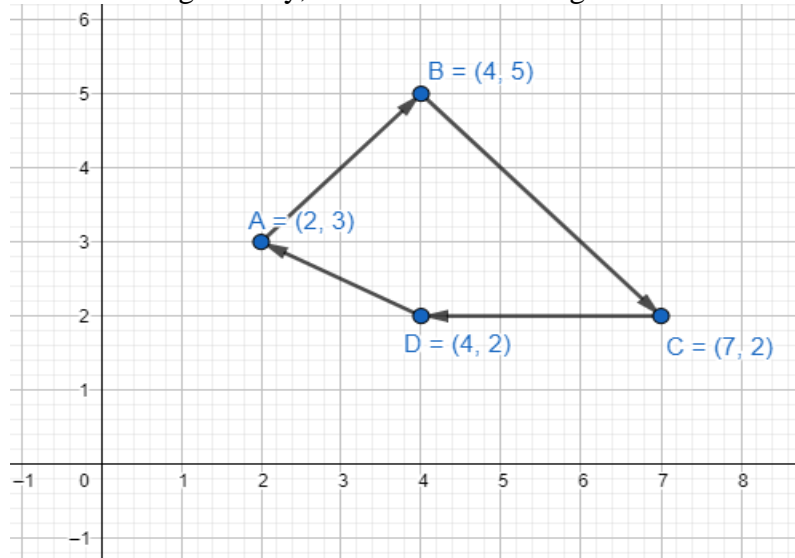
C) What is the actual distance from Zoya' s home to Amul shop.
A) 2   B) 4   C) $\sqrt{5}$ D) 1
ANS; C) $\sqrt{5}$ unit
ii) Distance covered by Zoya from her home to friend's house = ____ units
A) $\sqrt{8}$ B) $\sqrt{10}$ C) 8   D) 2
ANS: A) $\sqrt{8}$
iii) Actual distance from Zoya's house to the park = _____ units
A) $\sqrt{24}$ B) $\sqrt{27}$ C) 26   D) $\sqrt{26}$
ANS: D) $\sqrt{26}$
iv) Mid –point of side AC = _____
A) $\left(\frac{9}{2}, \frac{5}{2}\right)$ B) $\left(\frac{5}{2}, \frac{9}{2}\right)$ C) $\left(4, \frac{7}{2}\right)$ D) $\left(\frac{9}{2}, 0\right)$
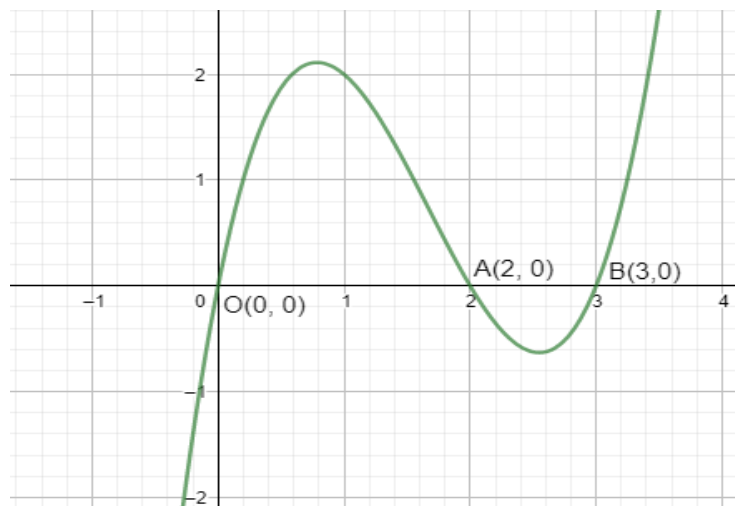ANS: A) $\left(\frac{9}{2}, \frac{5}{2}\right)$
v) Mid –point of side AB = _____
A) (3 ,3)   B) (4 , 4)   C) (4, 3)   D) (3 , 4)
ANS: D) (3 , 4)
29 Vraj asked Amber a question "Due to heavy storm, an electric wire got bent as shown in the figure."

i) What type of polynomial is represented by the graph?
A) Quadratic   B) Linear   C) Bi- quadratic D) cubic
ANS: D) cubic
ii) The number of zeroes of the polynomial (formed by the wire) are _____
A) 1   B) 2   C) 3   D) 4
ANS: C) 3
iii) The zeroes of the polynomial are _____
A) 0, 1, 2   B) 0, 2, 3   C) 1, 2, −3   D) 1, 2
ANS: B) 0, 2, 3
iv) A polynomial of degree n has _____
A) only one zero   B) at least n zeroes   C) at most n zeroes D) three zeroes
ANS: C) at most n zeroes
v) The polynomial is of the form_____
A) $x(x-1)(x+3)$ B) $x(x-2)(x-3)$ C) $x(x-2)(x+3)$ D) $(x-1)(x-3)$
ANS: B) $x(x-2)(x-3)$

30 A two wheeler manufacturer produced 20000 bikes in the third year and 35000 bikes in the ninth year. Assuming the production increases uniformly by a fixed number every year. Using the concepts of AP, find the following.
i) The production in the first year is _____
A) 15500   B) 15000   C) 10000   D) 17250
ANS: B) 15000
ii) The uniform increase of production (d) = _____
A) 5000   B) 2000   C) 2250   D) 2500
ANS: D) 2500
iii) The production in the 11th year is _____
A) 40000   B) 37250   C) 42250   D) 50000
ANS: A) 40000
iv) The total production in 4 years = _____
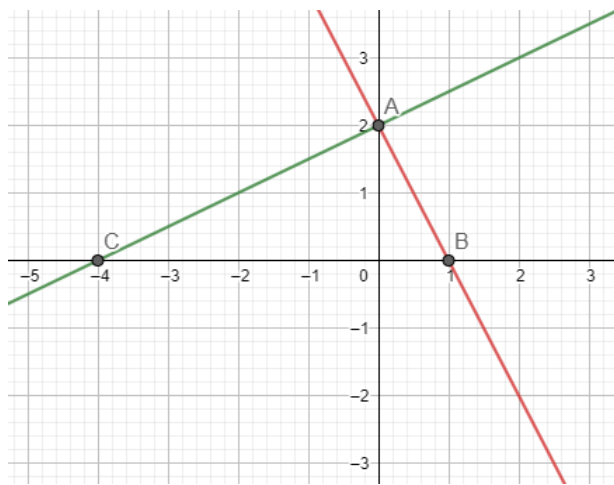A) 70000   B) 65000   C) 75000   D) 75500
ANS: C) 75000
v) General formula for the production in the nth year a_n = _____
A) $12500 + 2500n$ B) $15000 + 2500n$ C) $17500 + 2500n$ D) $12500 - 2500n$
ANS: A) $12500 + 2500n$

31 Find what type of triangle is ABC?

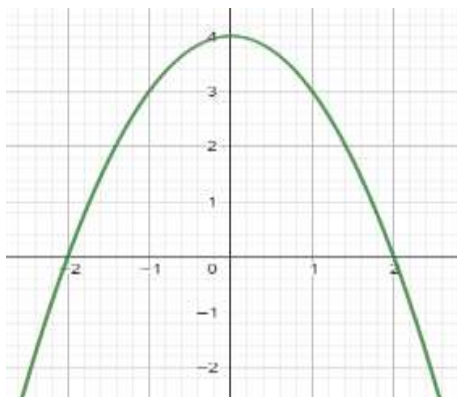ANS: A (0,2)   ,   B = (1, 0)   C(-4,0)

AB$= \sqrt{5}$ = AC $= \sqrt{20}$,   BC = 5
$5^2 = 25,$ $(\sqrt{20})^2 + (\sqrt{5})^2 = 25$
It is a right angled triangle

32 Given a graph of the quadratic polynomial. Find the product of the zeroes.

(A) 4   (B) −4
(C)   0   (D) −2

ANS; (B) −4

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