Sample Question Paper - 5
Class- IX Session- 2021-22
TERM 1
Subject- Mathematics

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 40**

General Instructions:

1. The question paper contains three parts A, B and C.
2. Section A consists of 20 questions of 1 mark each. Attempt any 16 questions.
3. Section B consists of 20 questions of 1 mark each. Attempt any 16 questions.
4. Section C consists of 10 questions based on two Case Studies. Attempt any 8 questions.
5. There is no negative marking.

Section A

Attempt any 16 questions

1. The value of 'x' in $3 + 2^x = (64)^{\frac{1}{2}} + (27)^{\frac{1}{3}}$ is **[1]**

   a) 14 b) 8

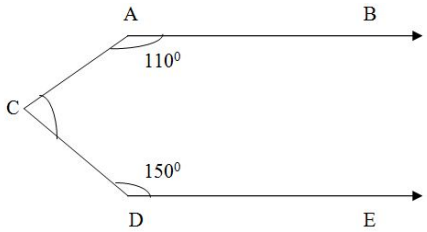
   c) 5 d) 3

2. The distance between the graphs of the equations y = -1 and y = 3 is **[1]**

   a) 4 b) 1

   c) 3 d) 2

3. In the adjoining figure, if AB $\parallel$ DE, then the measure of $\angle$ACD is :- **[1]**



   a) 90° b) 100^0

   c) 80° d) 70°

4. Each side of an equilateral triangle is 2x cm. If $x\sqrt{3} = \sqrt{48}$, then area of the triangle is : **[1]**

   a) $\sqrt{48}$ cm^2 b) $48\sqrt{3}$ cm^2

   c) $16\sqrt{3}$ cm^2 d) 16 cm^2

5. If $\frac{5-\sqrt{3}}{2+\sqrt{3}} = x + y\sqrt{3}$, then **[1]**

   a) x = -13, y = - 7 b) x = 13, y = -7

   c) x = -13, y = 7 d) x = 13, y = 7

6. The graph of the linear equation 2x + 3y = 6 meets the y-axis at the point. **[1]**

a) (0, 2) b) (2, 0)

c) (3, 0) d) (0, 3)

7. The point (7, 0) lies **[1]**

a) on the positive direction of y-axis b) on the positive direction of x-axis

c) in quadrant IV d) in quadrant II

8. Two sides of a triangle are of length 4 cm and 2.5 cm. The length of the third side of the triangle cannot be **[1]**

a) 6.3 cm b) 5.5 cm

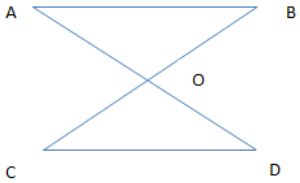
c) 6 cm d) 6.5 cm

9. The value of $(32)^{\frac{1}{5}} + (-7)^0 + (64)^{\frac{1}{2}}$ is **[1]**

a) 10 b) 0

c) 11 d) 1

10. **[1]**

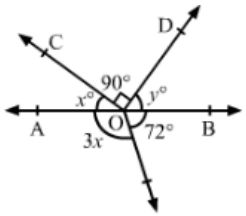


In the above figure AB $\parallel$ CD ,O is the mid point BC. Which of the following is true?

a) $\triangle$AOB $\cong$ $\triangle$DOC b) AB = CD

c) O is the mid point of AD d) All are true

11. In the adjoining figure, y = ? **[1]**



a) 72° b) 54°

c) 63° d) 36°

12. Which of the following is a correct statement? **[1]**

a) Sum of two rational numbers can never be an integer b) Sum of two irrational numbers is always irrational

c) Square of an irrational number is always a rational number d) Sum of a rational and irrational number is always an irrational number

13. If x= $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ and $y = \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$, then x + y + xy = **[1]**

a) 5 b) 9

c) 17 d) 7

14. The equation of y-axis is: **[1]**

a) x = 0 b) y = x

c) y = 0 d) none of these

15. If the graph of the equation 4x + 3y = 12 cuts the coordinate axes at A and B, then hypotenuse of right triangle AOB is of length **[1]**

a) None of these b) 3 units

c) 5 units d) 4 units

16. If the altitudes from two vertices of a triangle to the opposite sides are equal then the triangle is **[1]**

a) equilatera b) scalene

c) right angled d) isosceles

17. If each side of a $\triangle$ is halved then its perimeter will be decreased by **[1]**

a) 200% b) 25 $\%$

c) 70 $\%$ d) 50%

18. A grouped frequency table with class intervals of equal sizes using 250-270 (270 not included in this interval) as one of the class interval is constructed for the following data : **[1]**
268, 220, 368, 258, 242, 310, 272, 342, 310, 290, 300, 320, 319, 304, 402, 318, 406, 292, 354, 278, 210, 240, 330, 316, 406, 215, 258, 236. The frequency of the class 310 - 330 is:

a) 4 b) 7

c) 5 d) 6

19. An irrational number between $\frac{1}{7}$ and $\frac{2}{7}$ is **[1]**

a) $\sqrt{\frac{1}{7} \times \frac{2}{7}}$ b) none of these

c) $\left(\frac{1}{7} \times \frac{2}{7}\right)$ d) $\frac{1}{2}\left(\frac{1}{7} + \frac{2}{7}\right)$

20. A point is at a distance of 3 units from the x-axis and 7 units from the y-axis. Which of the following may be the co-ordinates of the point? **[1]**

a) (7, 3) b) (3, 7)

c) (4, 5) d) (0, 0)

Section B

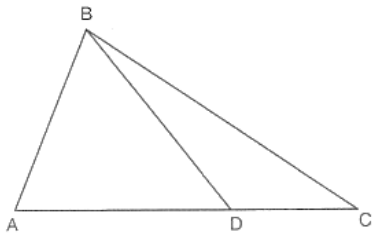
Attempt any 16 questions

21. If we divide both sides of a linear equation with a non-zero number, then the solution of the linear equation **[1]**

a) changes b) remains the same

c) none of these d) gets divided by the number

22. In figure, the ratio of AD to DC is 3 to 2. If the area of ΔABC is 40 cm^2 the area of ΔBDC ? **[1]**



a) 36 cm^2 b) 30 cm^2

c) 16 cm^2 d) 24 cm^2

23. The graph of a linear equation $y = \frac{9}{5}x + 32$ cuts the y-axis at the point **[1]**

a) (0 , 32) b) (-32 , 0)

c) (0 , -32) d) (32 , 0)

24. A point whose abscissa and ordinate are 2 and - 5 respectively, lies in **[1]**

a) Third quadrant b) Second quadrant

c) Fourth quadrant d) First quadrant

25. How many digits are there in the repeating block of digits in the decimal expansion of $\frac{17}{7}$? **[1]**

a) 6 b) 7

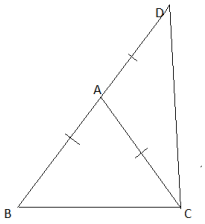
c) 26 d) 16

26. Semiperimeter of scalene triangle of side k, 2k and 3k is **[1]**

a) 3k b) 4k

c) 2k d) k

27. In an isosceles, $\triangle ABC$ AB = AC and side BA is produced to D such that AB=AD. Then the measure of $\angle BCD$ is **[1]**



a) 70^o b) 90^o

c) 100^o d) 60^o

28. Which of the following is a rational number? **[1]**

a) π b) $2\sqrt{3}$

c) 0 d) $1 + \sqrt{3}$

29. If the y co-ordinate of a point is zero, then this point always lies: **[1]**

a) in quadrant I b) on y-axis

c) on x-axis d) in quadrant II

30. The mean of n observations is $\overline{X}$. If each observation is multiplied by k, the mean of new observations is: **[1]**

a) $\overline{X}$ + k

b) k$\overline{X}$

c) $\frac{\overline{X}}{k}$

d) $\overline{X}$ - k

31. The area of a right-angled triangle if the radius of its circumcircle is 3 cm and altitude drawn to the hypotenuse is 2 cm. is **[1]**

a) 4 cm^2

b) 3 cm^2

c) 6 cm^2

d) 8 cm^2

32. The value of $\sqrt{p^{-1}q} \cdot \sqrt{q^{-1}r} \cdot \sqrt{r^{-1}p}$ is **[1]**

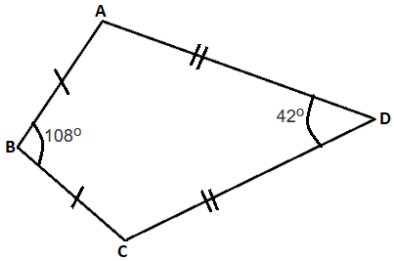
a) -1

b) 1

c) 2

d) 0

33. In figure, ABCD is a quadrilateral in which AB = BC and AD = DC. The measure of $\angle BCD$ is: **[1]**



a) 30°

b) 105°

c) 150°

d) 72°

34. If $\bar{x}$ represents the mean of observations $x_1, x_2, \ldots, x_n$, then value of $\sum_{i=1}^{n}(x_i - \bar{x})$is **[1]**

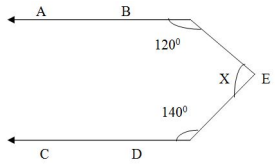
a) - 1

b) 1

c) n – 1

d) 0

35. In figure, AB and CD are parallel to each other. The value of x is: **[1]**



a) 120°

b) 100°

c) 140°

d) 90°

36. If a linear equation has solutions (-2, 2), (0, 0) and (2, -2), then it is of the form: **[1]**

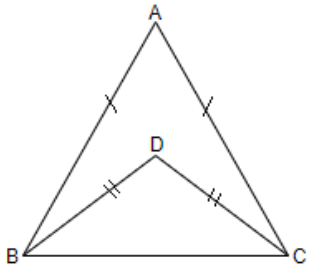
a) x + y = 0

b) -2x + y = 0

c) x – y = 0

d) -x + 2y = 0

37. In the adjoining Figure, AB = AC and BD = CD. The ratio ∠ABD : ∠ACD is **[1]**



a) 1 : 1

b) 1 : 2

c) 2 : 3

d) 2 : 1

38. $\frac{1}{\sqrt{9}-\sqrt{8}}$ is equal to **[1]**

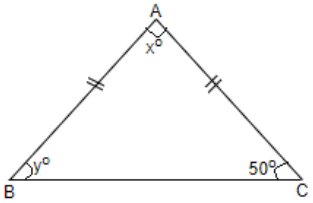
a) $\frac{1}{2}(3-2\sqrt{2})$

b) $3+2\sqrt{2}$

c) $3-2\sqrt{2}$

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

39. In the adjoining fig. AB = AC. If $\angle C$ = 50°, then the value of x and y are: **[1]**



a) x = 80° and y = 50°

b) x = 70° and y = 60°

c) x = 50° and y = 80°

d) x = 60° and y = 70°

40. For the frequency distribution given below, the adjusted frequency for the class 25-45 is: **[1]**

Class Interval	5-10	10-15	15-25	25-45	45-75
Frequency	6	12	10	8	15

a) 2

b) 3

c) 6

d) 5

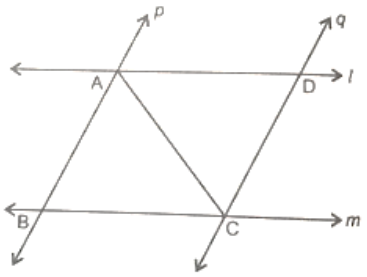
Section C

Attempt any 8 questions

Question No. 41 to 45 are based on the given text. Read the text carefully and answer the questions:

BSE stands for a disease called Bovine Spongiform Encephalopathy. **Bovine** means that the disease affects cows, **spongiform** refers to the way the brain from a sick cow looks spongy under a microscope, and encephalopathy indicates that it is a disease of the brain. This disease is commonly called **mad cow disease**.

A farmer has a field ABCD formed by two pair of parallel roads as shown below in which l||m and p||q. His four cows suffering from BXE. Thus, he tied them at four corners of the field ABCD.



41. If $\angle BAC = 30^o$, find $\angle ACD$. **[1]**

a) 90^o b) 30^o

c) 20^o d) 60^o

42. $\angle ABC + \angle BCD = 180^o$ as: **[1]**

a) Alternate interior angles are supplementary. b) Angles on the same side of a transversal are supplementary.

c) Alternate exterior angles are supplementary. d) Corresponding angles are supplementary.

43. If cow at C and cow at D is 2 km apart, then what is the distance between cow at A and cow at B? **[1]**

a) 1 km b) 3 km

c) 4 km d) 2 km

44. If $\angle B = 45^o$, then $\angle D =$ _____. **[1]**

a) 55^o b) 45^o

c) 50^o d) 40^o

45. If we join BD such that BD meet AC at O and $\angle BOC = 30^o$, then what is the measure of $\angle AOD$? **[1]**

a) 45^o b) 30^o

c) 90^o d) 60^o

Question No. 46 to 50 are based on the given text. Read the text carefully and answer the questions:

The following data given the weight (in grams) of 30 oranges picked from a basket:
106, 107, 76, 109, 187, 95, 125, 92, 70, 139, 128, 100, 88, 84, 99, 113, 204, 141, 136, 123, 90, 115, 110, 97, 90, 107, 75, 80, 118, 82.

Frequency distribution table:

Class Interval	Tally marks	Frequency
60 - 80	|||	3
80 - 100	𝍸 𝍸	10

100 - 120	~~||||~~ ||||	9
120 - 140	~~||||~~	5
140 - 160	|	1
160 - 180	-	0
180 - 200	|	1
200 - 220	|	1
Total	**30**	**30**

46. Class Size of given class data **[1]**

a) 10 b) 20

c) 15 d) 30

47. Classmark of forth class **[1]**

a) 20 b) 130

c) 70 d) 15

48. The number of oranges, whose weight is more than 180 g. **[1]**

a) 3 b) 1

c) 4 d) 2

49. The number of oranges, whose weight is less than 100 g. **[1]**

a) 3 b) 13

c) 5 d) 10

50. The range of data is **[1]**

a) 204 b) 274

c) 134 d) 70

Solution

Section A

1. **(d)** 3

   Explanation: $3 + 2^x = (64)^{\frac{1}{2}} + (27)^{\frac{1}{3}}$

   $\Rightarrow 3 + 2^x = \sqrt{64} + \sqrt[3]{27}$

   $\Rightarrow 3 + 2^x = 8 + 3$

   $\Rightarrow 2^x = 8 = 2^3$

   equating both,

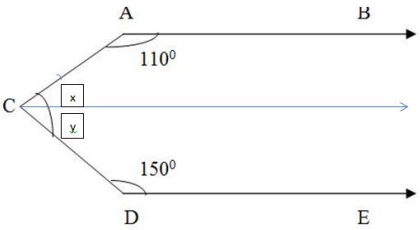
   x = 3

2. **(a)** 4

   Explanation: Distance between the graphs of the equations y = -1 and *y* = 3 is = 3 – (-1) = 4 units

3. **(b)** 100^0

   Explanation:

   x + 110° = 180° (Supplimentary angles)

   x = 70°

   y + 150° = 180° (Supplimentary angles)

   y = 30°

   ∠ACD = 70° + 30° = 100°

4. **(c)** $16\sqrt{3}\ \text{cm}^2$

   Explanation: Here , $x\sqrt{3} = \sqrt{48}$

   $\Rightarrow x = \sqrt{16}$

   Side = 2x

   Area of equilateral triangle = $\frac{\sqrt{3}}{4}(\text{Side})^2$

   = $\frac{\sqrt{3}}{4}(2x)^2$

   = $\sqrt{3}x^2$ sq. cm

   = $\sqrt{3}\left(\sqrt{16}\right)^2 = 16\sqrt{3}$

5. **(b)** x = 13, y = -7

   Explanation: $x + y\sqrt{3} = \frac{5-\sqrt{3}}{2+\sqrt{3}}$

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

   = $\frac{(5-\sqrt{3})(2-\sqrt{3})}{(2)^2-(\sqrt{3})^2}$

   = $\frac{5(2-\sqrt{3})-\sqrt{3}(2-\sqrt{3})}{4-3}$

   = $\frac{10-5\sqrt{3}-2\sqrt{3}+3}{1}$

   = 13 -7$\sqrt{3}$

   Hence, x+y$\sqrt{3}$ = 13-7$\sqrt{3}$

   $\Rightarrow$ x = 13, y = -7

6. **(a)** (0, 2)

   Explanation: If the graph of the linear equation 2x + 3y = 6 meets the y-axis, then x = 0.

   Substituting the value of x = 0 in equation 2x + 3y = 6, we get

2(0) + 3y = 6
$\Rightarrow$3y = 6
$\Rightarrow$y = 6/3
$\Rightarrow$ y = 2
So, the point of meeting is (0, 2).

7. **(b)** on the positive direction of x-axis
Explanation: Since value of y-ordinate is zero so, point lies on x-axis.
But value of x is +ve so it lies on +ve direction of x-axis.

8. **(d)** 6.5 cm
Explanation: Length of the greatest side of a triangle must be less than the sum of the other two sides.

9. **(c)** 11
Explanation: $(32)^{\frac{1}{5}} + (-7)^0 + (64)^{\frac{1}{2}}$
= 2 + 1 + 8
= 11

10. **(d)** All are true
Explanation: In $\triangle$AOB and $\triangle$DOC
$\angle$OAB = $\angle$ODC (alternate interior angles)
$\angle$OBA=$\angle$OCD
OB = OC (given)
So, from ASA congruence ,we have
$\triangle$AOB $\cong$ $\triangle$DOC
Now, from CPCT ,we have
AB = CD
OA = OD which means O is the mid-point of AD.
Hence ,all the given statements are true.

11. **(b)** 54°
Explanation: 54°
We have:
3x + 72 = 180° [$\because$ AOB is a straight line]
$\Rightarrow$ 3x = 108
$\Rightarrow$ x = 36
Also,
$\angle AOC + \angle COD + \angle BOD = 180^\circ$ [$\because$ AOB is a straight line]
$\Rightarrow$ 36° + 90° + y = 180°
$\Rightarrow$ y = 54°

12. **(d)** Sum of a rational and irrational number is always an irrational number
Explanation: Let the rational number be of the form $\frac{p}{q}$, where p $\in$ Z, while the rational number be r.
If r + $\frac{p}{q}$ is a rational then we have that, r + $\frac{p}{q}$ = $\frac{a}{b}$ for some a $\in$ Z and b $\in$ Z.
This means that r = $\frac{a}{b} - \frac{p}{q} = \frac{aq-bp}{bq}$ where aq – bp $\in$ Z
this contradicts the facts that r is irrational.
Hence, our assumption that r + $\frac{p}{q}$ is a rational is false.
Hence, it is an irrational number.
or
Sum of a rational and irrational number is always an irrational number.
for eg. a= 1 (which is rational)
and b = $\sqrt{2}$ = 1.414...
a+b = 1+$\sqrt{2}$ = 1+ 1.414... = 2.414...
which is irrational

13. **(b)** 9
Explanation: Given x= $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ and y = $\frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

Then,

$x + y + xy = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} + \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} + \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

$= \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} \times \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}} + \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}} \times \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}-\sqrt{3}} + 1$

$= \frac{(\sqrt{5}+\sqrt{3})^2}{5-3} + \frac{(\sqrt{5}-\sqrt{3})^2}{5-3} + 1$

$= \frac{(\sqrt{5})^2+(\sqrt{3})^2+2(\sqrt{5})(\sqrt{3})}{2} + \frac{(\sqrt{5})^2+(\sqrt{3})^2-2(\sqrt{5})(\sqrt{3})}{2} + 1$

$= \frac{5+3+2\sqrt{15}}{2} + \frac{5+3-2\sqrt{15}}{2} + 1$

$= \frac{8+2\sqrt{15}}{2} + \frac{8-2\sqrt{15}}{2} + 1$

$= 4 + \sqrt{15} + 4 - \sqrt{15} + 1$

$= 8+1$

$=9$

14. **(a)** x = 0

Explanation: The value of abscissa or x-corrdinate is always zero at any point on y-axis.

So, x = 0 is the equation of y-axis.

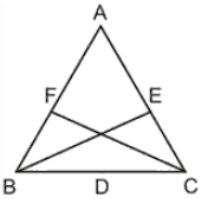
15. **(c)** 5 units

Explanation: 5 units

According to the given question, triangle so formed has sides of unit 3 and 4 , using pythagoras theorem , the largest side is of 5 units.

16. **(d)** isosceles

Explanation:



In triangles ABE and ACF

$\angle AEB = \angle AFC$ (90^o each)

$\angle BAE = \angle CAF$ (common angle)

$\Rightarrow \angle ABE = \angle ACF$ ... using angle sum property

BE = CF (given)

$\Rightarrow \Delta ABE \cong \Delta ACF$ (ASA)

$\Rightarrow$ AB = AC (c.p.c.t)

Hence, $\triangle$ABC is an isosceles triangle.... as two sides are equal to each other.

17. **(d)** 50%

Explanation: Perimeter of triangle with sides a, b and c is P = a + b + c. .....(i)

New sides are $\frac{a}{2}, \frac{b}{2}, \frac{c}{2}$

New perimeter = $\frac{a+b+c}{2} = \frac{P}{2}$. (From eq.(i))

Decreased perimeter = P - $\frac{P}{2} = \frac{P}{2}$

% of decreased perimeter = $\frac{P/2}{P} \times 100$ = 50%

18. **(d)** 6

Explanation:

The class interval is 250 - 270, 270 not included.

It means that the class is continuous.

Also, the data can be tabulated as follows:

Class Interval	**Tally marks**	**Frequency**
210 - 230	III	3
230 - 250	III	3

250 - 270	III	3
270 - 290	II	2
290 - 310	IIII	4
310 - 330	[illegible]	6
330 - 350	II	2
350 - 370	II	2
370 - 390	-	0
390 - 410	III	3

Thus, frequency of the class 310 - 330 is 6 as can be seen from the table.

19. **(a)** $\sqrt{\frac{1}{7} \times \frac{2}{7}}$

Explanation: An irrational number between a and b is given by $\sqrt{ab}$.

So, an irrational number between $\frac{1}{7}$ and $\frac{2}{7}$ is $\sqrt{\frac{1}{7} \times \frac{2}{7}}$.

20. **(a)** (7, 3)

Explanation: We know that distance of any point from x-axis is the y-ordinate, so here y-coordinate = 3.
Now, distance of any point from y-axis is the x coordinate of the point.
So, here x co-ordinate is = 7
Thus, point will be (7, 3)

Section B

21. **(b)** remains the same

Explanation: If then for any non-zero c. We can divide both sides of an equation by a non-zero number c, without changing the equation.

22. **(c)** 16 cm^2

Explanation: $\frac{AD}{DC}$ = $\frac{3}{2}$

Let AD = 3x and DC = 2x

Area of $\triangle$ABC = $\frac{1}{2}$ $\times$AC $\times$BE (BE = h)

$\Rightarrow$ 40 = $\frac{1}{2} \times 5x \times h$

$\Rightarrow$ 80 = 5 $\times$ h

$\Rightarrow$ xh =16 cm^2

Now Area of $\triangle$ABD = $\frac{1}{2}\times$ 3x $\times$ h = $\frac{3\times h}{2}$ = $\frac{3}{2}\times$ 16 = 24 cm^2

Area of $\triangle$BDC = Area of $\triangle$ABC - Area of $\triangle$ABD = 40 - 24 = 16 cm^2

23. **(a)** (0 , 32)

Explanation: when the graph cut at y axis in that case the value of x- coordinate is 0

$y = \frac{9}{5}x + 32$

$y = \frac{9}{5} \cdot 0 + 32$

y=32

so the co-ordinates are (32,0)

24. **(c)** Fourth quadrant

Explanation: As we know in the fourth coordinate abscissa is positive and ordinate is negative.

25. **(a)** 6

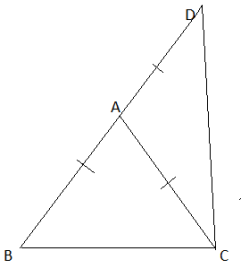
Explanation: $\frac{17}{7} = 2.\overline{428571}$

26. **(a)** 3k

Explanation: Semiperimeter of scalene triangle of side k, 2k and 3k = $\frac{k+2k+3k}{2}$ = 3k

27. **(b)** 90^o

Explanation:



Given in $\triangle$ABC, AB = AC

$\Rightarrow \angle$ABC = $\angle$ACB (Since angles opposite to equal sides are equal)

Also given that AD = AB

$\Rightarrow \angle$ADC = $\angle$ACD (Since angles opposite to equal sides are equal)

$\therefore \angle$ABC = $\angle$ACB = $\angle$ADC = $\angle$ACD = x(AB = AC = AD)

Also,$\angle$BCD = A$\angle$CB + $\angle$C$\angle$D = x + x = 2x

In $\triangle$BCD, $\angle$CBD + BC$\angle$D + $\angle$BDC = 180^o

x + 2x + x = 180^o

4x = 180^o

x = 45^o

$\angle$BCD = 2x = 90^o

28. **(c)** 0

Explanation: 0 is an integer and all integers are rational numbers.

29. **(c)** on x-axis

Explanation: Every point on the x-axis is of the form (a, 0). This means abscissa can be any real number but ordinate is always 0.

30. **(b)** $k\overline{X}$

Explanation: Let us take n observations X_i, ..., X_n

If $\overline{X}$ be the mean of the n observations, then we have

$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$

$\Rightarrow \sum_{i=1}^{n} X_i = n\overline{X}$

Multiply a constant k to each of the observations. Then the observations becomes kX_i, ... kX_n.

If $\overline{Y}$ be the mean of the new observations, then we have

$\overline{Y} = \frac{1}{n}\sum_{i=1}^{n} kX_i$

$= \frac{k}{n}\sum_{i=1}^{n} X_i$

$= k \cdot \frac{1}{n}\sum_{i=1}^{n} X_i$

$= k\overline{X}$

31. **(c)** 6 cm^2

Explanation: Since in a right-angled triangle, the circumcentre is the mid-point of the hypotenuse, then Hypotenuse = 2 $\times$ 3 = 6 cm

Now, Area of right-angled triangle = $\frac{1}{2}$ $\times$ Base $\times$ Altitude

= $\frac{1}{2} \times 6 \times 2$ = 6 sq. cm

32. **(b)** 1

Explanation: $\sqrt{p^{-1}q} \cdot \sqrt{q^{-1}r} \cdot \sqrt{r^{-1}p}$

= $\sqrt{\frac{q}{p}} \cdot \sqrt{\frac{r}{q}} \cdot \sqrt{\frac{p}{r}}$

$= \sqrt{\frac{q}{p} \cdot \frac{r}{q} \cdot \frac{p}{r}}$

= 1

33. **(b)** 105^o

Explanation: Join AC. We get two isosceles triangles,Δ ABC and Δ ACD

In Δ ABC,$\angle$ABC= 108^o

$\therefore \angle BAC = \angle BCA = (180^o - 108^o) / 2 = \frac{72^\circ}{2} = 36^o$

In Δ ACD,$\angle$ADC= 42^o

$\therefore \angle DAC = \angle DCA = (180^o - 42^o) / 2 = 138^o/2 = 69^o$

Now, $\angle$ BCD = $\angle BCA + \angle DCA = 36^o + 69^o = 105^o$

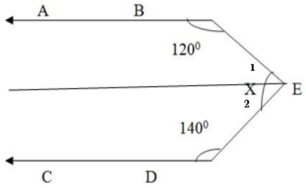
34. **(d)** 0

Explanation: Since mean is equal to the sum of all the values in the data set divided by the number of values in the data set also called as average.

Hence, sum of difference of all the numbers & mean value will be zero.

35. **(b)** 100°

Explanation:



let us draw a line from point E parallel to line AB , CD

X = $\angle$1 + $\angle$2

AB $\parallel$ EF

$\angle$1 + 120° = 180° (co - interior angle)

$\angle$1 = 180° - 120°

$\angle$1 = 60°

CD $\parallel$ EF

$\angle$2 + 140° = 180° (co - interior angle)

$\angle$2 = 180° - 140°

$\angle$1 = 40°

X = $\angle$1 + $\angle$2

X = 60° + 40°

36. **(a)** x + y = 0

Explanation: Linear equation has solutions (-2, 2), (0, 0) and (2, -2), then the equation will be

x + y = 0

As all the given three points satisfy the given equation

37. **(a)** 1 : 1

Explanation: In $\triangle$ABC

AB = AC

$\therefore$ $\angle$ABC = $\angle$ACB(angles opposite to equal sides of a triangle are equal) 1

in $\triangle$DBC,

DB = DC,

$\therefore$ $\angle$DBC = $\angle$DCB(angles opposite to equal sides of a triangle are equal) 2

subtract 2 from 1

$\angle$ABC - $\angle$DBC = $\angle$ACB - $\angle$DCB(equals subtracted from equals gives equal)

= $\angle$ABD = $\angle$ACD

divide both the sides by $\angle$ACD

$\Rightarrow \frac{\angle ABD}{\angle ACD}$ = 1

$\therefore$ $\angle$ABD : $\angle$ACD = 1 : 1

38. **(b)** $3 + 2\sqrt{2}$
Explanation: After rationalising:
$\frac{1}{\sqrt{9}-\sqrt{8}} = \frac{1}{\sqrt{9}-\sqrt{8}} \times \frac{\sqrt{9}+\sqrt{8}}{\sqrt{9}+\sqrt{8}}$
$= \frac{\sqrt{9}+\sqrt{8}}{(\sqrt{9})^2-(\sqrt{8})^2}$
$= \frac{\sqrt{3\times3}+\sqrt{2\times2\times2}}{9-8}$
$= \frac{3+2\sqrt{2}}{1}$
$= 3+ 2\sqrt{2}$

39. **(a)** x = 80^o and y = 50^o
Explanation: In triangle ABC, AB = AC ,hence their opposite angles will be equal.
$\Rightarrow \angle B = \angle C = 50^o$
$\Rightarrow$ y = 50^o
Now, by angle sum property,
$\angle A + \angle B + \angle C = 180^o$
or, x + 50^o + 50^o = 180^o
or, x + 100^o = 180^o
$\Rightarrow$ x = 80^o

40. **(a)** 2
Explanation: Adjusted frequency for the class 25-45 is
10 - 8 = 2

Section C

41. **(b)** 30^o
Explanation: p||q abd AC is a transversal. Thus, $\triangle$BAC and $\angle$ACD are alternate interior angles.
Therefore, $\angle$BAC = $\angle$ACD = 30^o (alternate interior angles are equal).

42. **(b)** Angles on the same side of a transversal are supplementary.
Explanation: Angles on the same side of a transversal are supplementary.

43. **(d)** 2 km
Explanation: Since, p||q and l||m thus, ABCD is a parallelogram. Also, since opposite sides of a parallelogram are equal.
So, AB = CD
Given, distance between cow at C and cow at D = CD = 2 km
$\Rightarrow$ AB = 2 km
Hence, distance cow at A and cow at B is 2 km.

44. **(b)** 45^o
Explanation: Since, $\angle$B = 45
$\Rightarrow \angle$D = 45
(opposite angles of a parallelogram are equal)

45. **(b)** 30^o
Explanation: $\angle$BOC = $\angle$AOD = 30
(vertically opposite angles are equal)

46. **(b)** 20
Explanation: 20

47. **(b)** 130
Explanation: 130

48. **(d)** 2
Explanation: 2

49. **(b)** 13
Explanation: 13

50. **(c)** 134
Explanation: 134