CASE STUDY/SOURCE BASED INTEGRATED MCQs

1: REAL NUMBERS

1. Richa has three bags A, B and C as shown in Fig. 1.1. Bag A contains all rational numbers, bag B contains all irrational numbers and bag C contains initially nothing.
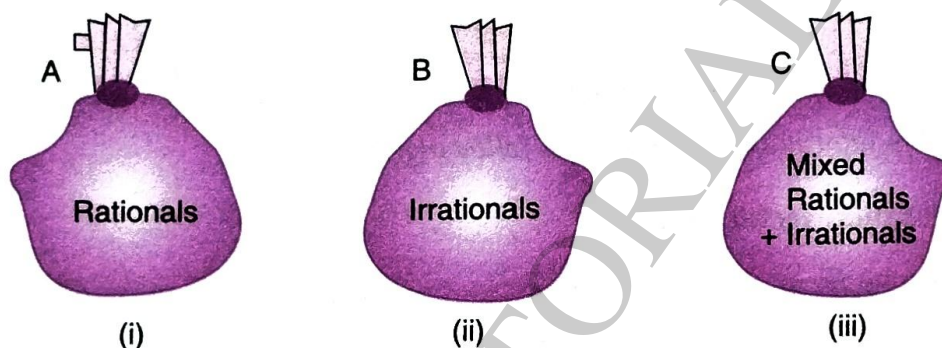

A — Rationals (i)

B — Irrationals (ii)

C — Mixed Rationals + Irrationals (iii)

Fig. 1.1

Based on the above information, answer the following questions:

(i) If all members of bag A and that of bag B are collected in another bag C, then bag C can be tagged as:

(a) Natural numbers   (b) Whole numbers

(c) Integers   (d) Real numbers

(ii) Which of the following belongs to bag B ?

(a) $\dfrac{\sqrt{12}}{\sqrt{3}}$ (b) $(27)^{1/3}$ (c) $(32)^{1/5}$ (d) $(4)^{1/4}$

(iii) A member x of bag A and member y of bag B are taken. Then which of the following will not be present in B ?

(a) $x + y$ (b) $x - y$ (c) xy (d) None of these

(iv) Which of the following does not belong to bag A ?

(a) 0.14 (b) $0.14\overline{16}$

(c) $0.\overline{1416}$ (d) $0.40\ 1400\ 14000\ 14\ldots\ldots\ldots$

(v) x_1 and x_2 are two members of bag A and y_1 and y_2 are two members of bag B. Then, which of the following is true ?

(a) $x_1 - x_2$ will be a member of B

(b) $\dfrac{x_1}{x_2}$ will be a member of A, where $x_2 \neq 0$

(c) $x_1 + y_1$ will be a member of A

(d) $y_1 y_2$ will be a member of A.

Answers

1. (i) $\to$ (d)   (ii) $\to$ (d)   (iii) $\to$ (d)   (iv) $\to$ (d)   (v) $\to$ (b)

2. x and y are two irrational numbers given by $x = 5 - 2\sqrt{6}$ and $y = 3 + 2\sqrt{2}$. Based on this information, answer the following questions:

(i) Rationalisation factor of x is

(a) $-5 - 2\sqrt{6}$ (b) $5 + 2\sqrt{6}$ (c) $-5 + 2\sqrt{6}$ (d) None of these

(ii) $x + \dfrac{1}{x} =$

(a) 0   (b) $-4\sqrt{6}$ (c) 10   (d) $4\sqrt{6}$

(iii) $x^2 + \dfrac{1}{x^2} =$

(a) 96   (b) 98   (c) 100   (d) None of these

(iv) $y - \dfrac{1}{y} =$

(a) 0   (b) $4\sqrt{2}$ (c) 6   (d) $-4\sqrt{2}$

(v) If $\dfrac{1}{x} + \dfrac{1}{y} = a + b\sqrt{2} + c\sqrt{6}$, then $a + b + c =$

(a) 8   (b) 10   (c) 12   (d) None of these

Answers

2. (i) $\to$ (b)   (ii) $\to$ (c)   (iii) $\to$ (b)   (iv) $\to$ (b)   (v) $\to$ (a)

3. Given that a, b, c and d are the first four natural numbers as powers of 3. On the basis of this information, answer the following questions:

(i) Rationalisation factor of $\sqrt{c}$ is

(a) $\sqrt{3}$ 　　　　(b) 3 　　　　(c) $\sqrt{27}$ 　　　　(d) 1

(ii) If $a^{2x-9} = c$, then $x =$

(a) 4 　　　　(b) 5 　　　　(c) 6 　　　　(d) 7

(iii) If x, y, z are rational numbers such that $a^x = b^y = c^z$, then $\dfrac{1}{x} + \dfrac{1}{z} =$

(a) $2y$ 　　　　(b) y 　　　　(c) $\dfrac{1}{y}$ 　　　　(d) $\dfrac{2}{y}$

(iv) $\dfrac{c^{3n+1} \times d^{-n}}{b^{n+5} \times a^{3n-7}} =$

(a) 3^{2n} 　　　　(b) 3^{n-1} 　　　　(c) 3 　　　　(d) 1

Answers

3. (i) → (a) 　　　(ii) → (c) 　　(iii) → (d) 　　(iv) → (d)

4. Saneha, a Mathematics teacher, tells her students that real numbers are the numbers which include both rational and irrational numbers. Rational numbers are the numbers which can be written in the form of $\dfrac{p}{q}$ where p and q are integers and q ≠ 0. Irrational numbers are those numbers which cannot be expressed as a ratio of two integers.

Based on the above, answer the following questions:

(i) Every rational number is:

(a) a natural number 　　　　(b) a whole number

(c) an integer 　　　　(d) a real number

(ii) The product of two irrational numbers is:

(a) always rational 　　　　(b) always irrational

(c) always integer 　　　　(d) may be rational or irrational

(iii) Between two rational numbers

(a) there is no rational number 　　　　(b) there is exactly one rational number

(c) there are infinite irrational numbers 　　(d) there is no irrational number

(iv) The sum of a rational and an irrational numbers is:

(a) irrational 　　　　(b) rational

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

(v) Which of the following is an irrational number ?

    (a) 3.14   (b) 3.14 14 14 ....

    (c) 1.4444 ....   (d) 3.140 1400 14000 14 ....

Answers

4. (i) → (d)   (ii) → (d)   (iii) → (c)   (iv) → (a)   (v) → (d)

2: POLYNOMIALS

1. Let $p(x)$ be a polynomial given by $p(x) = x^3 - kx - 16$, where k is a constant real number. Based on the above information, answer the following questions:

    (i) $p(0) =$

    (a) 0   (b) -16 (c) 16   (d) None of these

    (ii) If $x + 2$ is a factor of $p(x)$, then $k =$

    (a) 0   (b) 4   (c) 8   (d) 12

    (iii) If $p(x)$ is multiple of $x - 3$, then $k =$

    (a) 0   (b) 11   (c) 11/3   (d) None of these

    (iv) If $p(x)$, when divided by $x + 1$, leaves remainder -10, then $k =$

    (a) 27   (b) 7   (c) -7 (d) -17

    (v) Which of the following is not a polynomial ?

    (a) $\sqrt{3}x^2 + 5$ (b) $(x + \sqrt{2})^2$ (c) $x\sqrt{x} + 3$ (d) None of these

Answers

1. (i) → (b)   (ii) → (d)   (iii) → (c)   (iv) → (b)   (v) → (c)

2. Given that $a + b + 3 = 0$ and $ab = -4$. Based on the above information, answer the following questions:

    (i) $a^2 + b^2 =$

    (a) 1   (b) 13   (c) 9   (d) 17

    (ii) $a^3 + b^3 =$

    (a) -27 (b) -63 (c) 27   (d) 63

    (iii) $|a - b| =$

    (a) 5   (b) 2   (c) 1   (d) 9

    (iv) $a^3 + b^3 + 27 =$

    (a) $-9ab$ (b) $-3ab$ (c) $3ab$ (d) $9ab$

(v) $(a-b)^3 + (2b-3)^3 + 6^3 - 18(a-b)(2b-3) =$

    (a) 1   (b) 0   (c) −1   (d) None of these

Answers

2. (i) → (d)   (ii) → (b)   (iii) → (a)   (iv) → (d)   (v) → (b)

3. *Class IX of Kendriya Vidyalaya has x students. On a 2nd Saturday, $\frac{1}{12}$ th times the square*

   of the total number of students planned to visit historical monuments. $\frac{7}{12}$ th times the number

   of students planned to visit old age homes while 10 students decided to teach poor children.

   Based on the above information, answer the following questions:

   (i) The total number of students in a polynomial in terms of x is:

       (a) $x^2 + 7x + 22$ (b) $\frac{1}{12}x^2 + \frac{7}{12}x + 12$

       (c) $\frac{1}{12}x^2 + \frac{7}{12}x + 10$ (d) None of these

   (ii) Degree of the polynomial is:

       (a) 1   (b) 2   (c) 3   (d) 4

   (iii) If the total number of students is 96, then how many students planned to visit the historical monuments ?

       (a) 768   (b) 762   (c) 760   (d) 764

   (iv) Number of students planning to visit old age homes is:

       (a) 54   (b) 52   (c) 56   (d) 60

   (v) Total number of students planned to visit historical monuments and old age homes is:

       (a) 804   (b) 824   (c) 816   (d) 814

Answers

3. (i) → (c)   (ii) → (b)   (iii) → (a)   (iv) → (c)   (v) → (b)

4. *Rakesh sells x kg of apples at the rate of ₹ 80 per kg, some oranges at the rate of ₹ 48 per kg, whose quantity is equal to the square of the apple quantity. Along that he sells 10 kg pomegranate at the rate of ₹ 120 per kg.*

   Based on the above information, answer the following questions:

   (i) Equation of the total cost of the quantity is:

       (a) $C(x) = 48x^2 + 80x + 1200$ (b) $C(x) = 20x^2 + 40x + 600$

       (c) $C(x) = 40x^2 + 40x + 800$ (d) $C(x) = 40x^2 + 80x + 400$

(*ii*) Equation of the total quantity is:

(*a*) $q(x) = x^2 + x + 5$ (*b*) $q(x) = x^2 + x + 10$

(*c*) $q(x) = x^2 + 2x + 5$ (*d*) $q(x) = x^2 + 3x + 15$

(*iii*) The mathematical concept used in this case is:

(*a*) number system   (*b*) polynomial concept

(*c*) linear equation   (*d*) real number concept

(*iv*) Degree of an equation of total cost of quantity is:

(*a*) 1   (*b*) 3   (*c*) 2   (*d*) 0

(*v*) If Rakesh sells 5 kg of apples, then how much money does he earn ?

(*a*) ₹ 2400   (*b*) ₹ 2200   (*c*) ₹ 2600   (*d*) ₹ 2800

Answers

4. (*i*) → (*a*)   (*ii*) → (*b*)   (*iii*) → (*b*)   (*iv*) → (*c*)   (*v*) → (*d*)

3: LINEAR EQUATIONS IN TWO VARIABLES

1. The two variables '*x*' and '*y*' are related by a linear relationship given by $3x + 4y - 12 = 0$.

   Based on the above information, answer the following questions:

   (*i*) The graphical representation of the equation $3x + 4y - 12 = 0$ is a

   (*a*) point   (*b*) line

   (*c*) circle   (*d*) Any one of these

   (*ii*) The number of solution(s) of the equation $3x + 4y - 12 = 0$ is (are)

   (*a*) one   (*b*) two   (*c*) three   (*d*) infinite many

   (*iii*) Which of the following is a solution of the equation $3x + 4y - 12 = 0$

   (*a*) (8, 3)   (*b*) (– 8, 3)   (*c*) (8, – 3)   (*d*) (– 8, – 3)

   (*iv*) For what value of *k*, (4, 2) is a solution of the equation $3x + 4y - k = 0$

   (*a*) 20   (*b*) 4   (*c*) – 4   (*d*) – 20

   (*v*) Which of the following can be considered as a linear equation in one variable as well as in two variables ?

   (*a*) $3x = 12$ (*b*) $4y = 12$

   (*c*) both (*a*) and (*b*)   (*d*) None of (*a*) and (*b*)

Answers

1. (*i*) → (*b*)   (*ii*) → (*d*)   (*iii*) → (*c*)   (*iv*) → (*a*)   (*v*) → (*c*)

2. Let y varies directly as x. Also $y = 12$ when $x = 4$. Using this information, answer the following questions:

(i) The linear equation which represents the given information algebraically is

(a) $y = 2x$ (b) $y = 8x$ (c) $y = 6x$ (d) $y = 3x$

(ii) What is the value of y when $x = 5$?

(a) 5   (b) 10   (c) 15   (d) 18

(iii) A solution of the equation, representing the given information, which lies on the x-axis is

(a) (0, 3)   (b) (0, 0)   (c) (3, 0)   (d) None of these

(iv) The point of the form (a, a) always lies on

(a) x-axis   (b) y-axis

(c) on the line $y = x$ (d) on the line $x + y = 0$

(v) The positive solutions of the equation $ax + by + c = 0$ always lie in the

(a) 1st quadrant   (b) 2nd quadrant   (c) 3rd quadrant   (d) 4th quadrant

Answers

2. (i) → (d)   (ii) → (c)   (iii) → (b)   (iv) → (c)   (v) → (a)

3. The linear equation that represents Fahrenheit (F) to celsius (C) is given by the relation $C = \dfrac{5F - 160}{9}$. Based on the above information, answer the following questions:

(i) If the temperature is 86°F, what is the temperature in Celsius ?

(a) 10°   (b) 20°   (c) 30°   (d) 40°

(ii) If the temperature is 35°C, what is the temperature in Fahrenheit ?

(a) 105°   (b) 95°   (c) 85°   (d) 75°

(iii) What is the numerical value of the temperature which is the same in both the scales ?

(a) – 40°   (b) 40°   (c) – 50°   (d) 50°

(iv) If temperature is 0°C, what is the temperature in Fahrenheit ?

(a) 30°   (b) 32°   (c) 34°   (d) 36°

(v) Some studies have shown that the "normal" human body temperature can have a wide range from 36.1°C to 37.2°C or

(a) 98°F to 99°F   (b) 97°F to 99°F   (c) 98°F to 100°F   (d) 97°F to 100°F

Answers

3. (i) → (c)   (ii) → (b)   (iii) → (a)   (iv) → (b)   (v) → (b)

4. In Class IX of Army Public School Delhi, there are some boys and some girls. If the difference between the squares of numbers of boys and girls is 400 and when the number of boys multiplied with the number of girls, result is 375. The difference in their number is 10. Assume the number of boys as 'x' and the number of girls as 'y'.

Fig. 3.1

Based on the above information, answer the following questions:

(i) Equation corresponding to the first two conditions is:

(a) $x^2 - y^2 = 400$, $xy = 375$ (b) $x^2 - y^2 = 200$, $xy = 125$

(c) $x^2 + y^2 = 400$, $xy = 375$ (d) $x^2 - y^2 = 400$, $xy = 125$

(ii) Equation corresponding to the third condition is:

(a) $x + y = 10$ (b) $x - y = 10$ (c) $x + y = 15$ (d) $x - y = 15$

(iii) Total number of students is:

(a) 36   (b) 42   (c) 40   (d) 30

(iv) Number of boys is:

(a) 30   (b) 15   (c) 20   (d) 25

(v) Number of girls is:

(a) 30   (b) 15   (c) 20   (d) 25

Answers

4. (i) → (a)   (ii) → (b)   (iii) → (c)   (iv) → (d)   (v) → (b)

5. Gautam bought 5 notebooks and 2 pens for ₹ 120. He asked to his friends to guess the cost of each notebook and pen to his friends Sunil and Anil. Gautam has given the clue that both the costs are positive integers and divisible by 5 such that the cost of a notebook is greater than that of a pen. Now, Sunil and Anil tried to guess. Sunil said that price of each notebook could be ₹ 18. Thus, five notebooks would cost ₹ 90, two pens would cost ₹ 30 and each pen could be for ₹ 15. Anil felt that ₹ 18 for one notebook was too little, it should be at least, ₹ 20 and price of each pen should be ₹ 10. Assume the cost of one notebook as 'x' and that of one pen as 'y'.
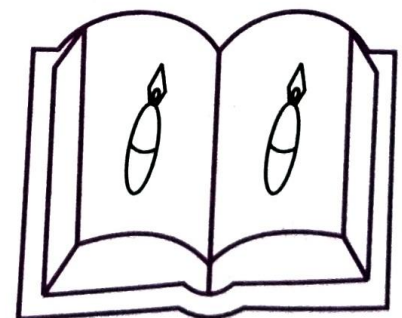
Fig. 3.2

Based on the above information, answer the following questions:

(i) The linear equation in two variables, describing above situation is

(a) $2x + 3y = 120$ (b) $5x + y = 120$ (c) $x + y = 120$ (d) $5x + 2y = 120$

(ii) The solution of equation found in Part (i) is:

(a) $x = 10$, $y = 20$ (b) $x = 20$, $y = 10$ (c) $x = 10$, $y = 15$ (d) None of these

(iii) If cost of one notebook is ₹ 15 and cost of one pen is ₹ 10, then the total amount is:

(a) ₹ 120   (b) ₹ 105   (c) ₹ 95   (d) ₹ 125

(iv) If the cost of one notebook is twice the cost of one pen, then the cost of one pen is:

(a) ₹ 20   (b) ₹ 10   (c) ₹ 5   (d) ₹ 15

(v) Which is the standard form of linear equation $y = 4$ in two variables ?

(a) $y - 4 = 0$ (b) $1.y + 4 = 0$
(c) $0.x + 1.y + 4 = 0$ (d) $0.x + 1.y - 4 = 0$

Answers

5. (i) → (d)   (ii) → (b)   (iii) → (c)   (iv) → (b)   (v) → (d)

4: CO-ORDINATE GEOMETRY

1. Class IX students of a Secondary School in Krishnagar have been allotted a rectangular plot of a land for gardening activity. Saplings of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is a triangular grassy lawn in the plot as shown in the Fig. 4.1. The students are to sow seeds of flowering plants on the remaining area of the plot. Consider P as origin, PQ along x-axis and PS along y-axis.

Based on the above information, answer the following questions:
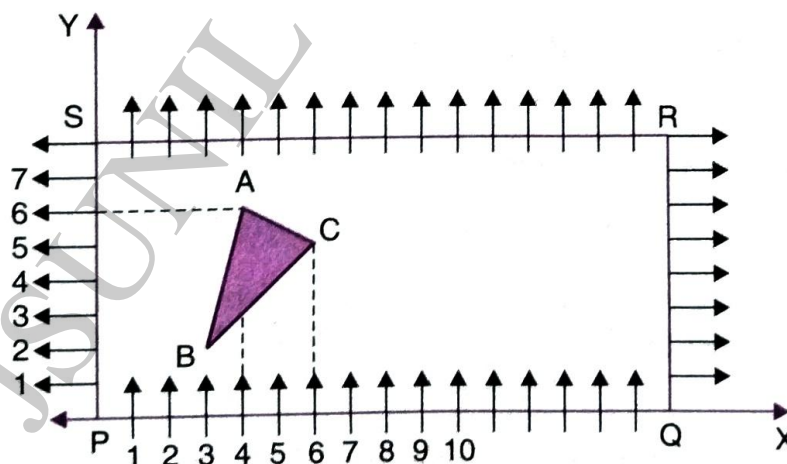
Fig. 4.1

(i) What are the coordinates of P ?

(a) (0, 1)   (b) (1, 0)   (c) (0, 0)   (d) (−1, −1)

(ii) What are the coordinates of A ?

(a) (4, 6)   (b) (6, 4)   (c) (4, 5)   (d) (5, 4)

(iii) What are the coordinates of C ?

   (a) (6, 5)   (b) (5, 6)   (c) (6, 0)   (d) (7, 4)

(iv) What are the coordinates of Q ?

   (a) (16, 0)   (b) (0, 0)   (c) (0, 16)   (d) (16, 1)

(v) What are the coordinates of A if Q is taken at the origin, QP along negative x-axis and QR along y-axis ?

   (a) (12, 2)   (b) (–12, 6)   (c) (12, 3)   (d) (6, 10)

Answers

1. (i) → (c)   (ii) → (a)   (iii) → (a)   (iv) → (a)   (v) → (b)

2. **Reflection of a Point in Axes**

   As per our knowledge of Physics, the image of a point formed in a plane mirror, is a point at the same distance as the distance at which object is placed before mirror.

   If x-axis is considered as a plane mirror then image of a point P(x, y) in x-axis will be another point Q(x, −y). Similarly image of point R(x, y) in y-axis will be another point S(−x, y).

   Based on the above information, answer the following questions:
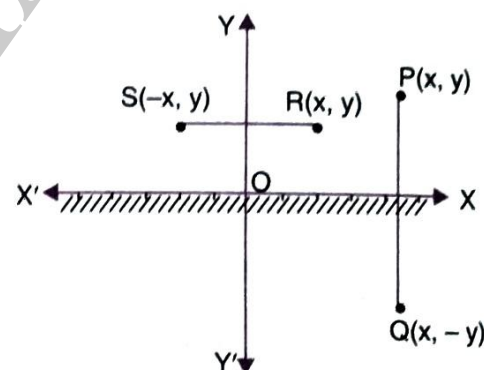
Fig. 4.2

(i) What is the image of point (2, −3) in x-axis ?

   (a) (2, 3)   (b) (−2, 3)   (c) (−2, −3)   (d) (−3, 2)

(ii) What is the image of point (2, −3) in y-axis ?

   (a) (2, 3)   (b) (−2, 3)   (c) (−2, −3)   (d) (−3, 2)

(iii) Let A(3, −4) and B(2, 1) be two points such that their images in x-axis are A′ and B′. Which geometrical shape is AB′BA′ ?

   (a) Rectangle   (b) Square   (c) Kite   (d) Trapezium

(iv) Ordinate of a point, which lies on y-axis is 4. Its image in x-axis will have the coordinates.

   (a) (0, 4)   (b) (4, 0)   (c) (−4, 0)   (d) (0, − 4)

(v) The perpendicular distance of point P(3, 4) from its image in x-axis is

   (a) 6   (b) 8   (c) 3   (d) 4

Answers

2. (i) → (a)   (ii) → (c)   (iii) → (d)   (iv) → (d)   (v) → (b)

3. *Rohit is flying a kite as shown in Fig. 4.3. Consider 1 cm as 1 unit on both the axes.*
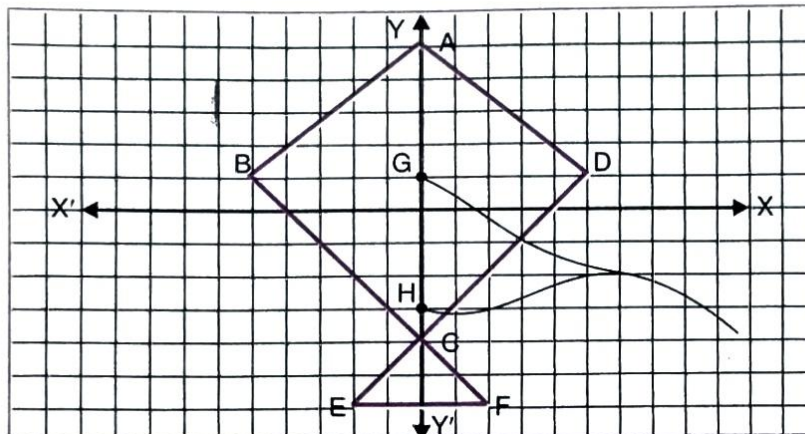

Fig. 4.3

Based on the above information, answer the following questions regarding his kite.

(i) Coordinates of B are

    (a) (1, 5)   (b) (–5, 1)   (c) (–1, –5)   (d) (–5, –1)

(ii) Sum of ordinates of the points A and C, is

    (a) 7   (b) 5   (c) 1   (d) –1

(iii) The height of the kite, including tail is

    (a) 7 units   (b) 11 units   (c) 6 units   (d) 5 units

(iv) What is the distance between two ties of threads ?

    (a) 4 units   (b) 1 unit   (c) 2 units   (d) None of these

(v) Which pairs of points have the same value of abscissa but are opposite in sign.

    (a) B and D   (b) E and F   (c) G and H   (d) both (a) and (b)

Answers

3. (i) → (b)   (ii) → (c)   (iii) → (b)   (iv) → (a)   (v) → (d)

6: LINES AND ANGLES

1. *There are two angles* ∠ABC *and* ∠DEF *such that their arms are parallel. This information leads to follow the three situations as depicted in Fig. 6.1.*

Case (a)   Case (b)   Case (c)
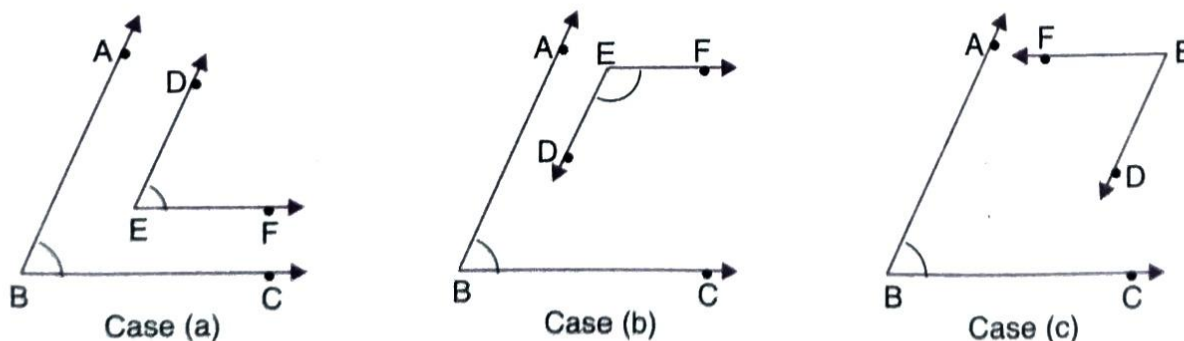
Fig. 6.1

Based on the above information, answer the following questions:

(*i*) In Case (*a*), the relation between ∠ ABC and ∠ DEF is

    (*a*) ∠ ABC > ∠ DEF   (*b*) ∠ ABC = ∠ DEF

    (*c*) ∠ ABC = ∠ DEF – 30°   (*d*) ∠ ABC + ∠ DEF = 90°

(*ii*) In Case (*b*), the relation between ∠ ABC and ∠ DEF is

    (*a*) ∠ ABC = ∠ DEF   (*b*) ∠ ABC + ∠ DEF = 90°

    (*c*) ∠ ABC + ∠ DEF = 180°   (*d*) ∠ ABC + ∠ DEF = 360°

(*iii*) In Case (*c*), the relation between ∠ ABC and ∠ DEF is

    (*a*) ∠ ABC and ∠ DEF are complementary angles

    (*b*) ∠ ABC and ∠ DEF are equal angles

    (*c*) ∠ ABC and ∠ DEF are supplementary angle

    (*d*) ∠ ABC and ∠ DEF form a linear pair

(*iv*) *l* and *m* are two perpendicular lines, *p* is drawn parallel to *l* and *q* is drawn parallel to *m*, then *p* and *q* are

    (*a*) parallel   (*b*) perpendicular

    (*c*) intersecting but not perpendicular   (*d*) not possible to draw

(*v*) In Case (*a*), if *l* bisects ∠ ABC and *m* bisects ∠ DEF then *l* and *m* are

    (*a*) parallel   (*b*) perpendicular

    (*c*) intersecting but not perpendicular   (*d*) not possible to draw

Answers

1. (*i*) → (*b*)   (*ii*) → (*c*)   (*iii*) → (*b*)   (*iv*) → (*b*)   (*v*) → (*a*)

2. In a video game being played by children, a path ACEF is prepared, as shown in Fig. 6.2 below:
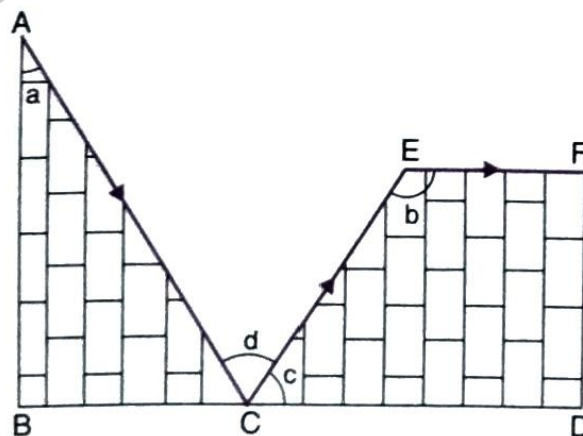
Fig. 6.2

AB and *FD* are vertical lines while *BCD* and *EF* are horizontal lines.

$$\angle BAC = a; \quad \angle CEF = b; \quad \angle ECD = c; \quad \angle ACE = d$$

Based on the above information, answer the following questions:

(i) *b* and *c* are called

(a) corresponding angles

(b) alternate interior angles

(c) consecutive interior angles

(d) forming a linear pair

(ii) If *b* = 120° then *c* =

(a) 120°   (b) 80°   (c) 50°   (d) 60°

(iii) If *a* = 30° and *b* = 120°, then relation between *c* and *d* is

(a) $c + d = 90°$ (b) $c = d$ (c) $c > d$ (d) $c < d$

(iv) If *b* = 120° and AB = BC, then *d* =

(a) 60°   (b) 65°   (c) 70°   (d) 75°

(v) If *d* = 90° and AB = AC, then relation between *a* and *c* is

(a) $a + c = 90°$ (b) $a > c$ (c) $a = c$ (d) $a < c$

Answers

2. (i) → (c)   (ii) → (d)   (iii) → (b)   (iv) → (d)   (v) → (c)

3. Harsh, a Mathematics teacher tells his students that today we shall prove that the sum of all the three angles of triangle ABC is 180°.

Further, he asks them to draw any triangle ABC in the notebook and extend the side BC to D. Also, draw CE ∥ BA and mark angles as ∠1, ∠2, ∠3, ∠4, ∠5 as shown in Fig. 6.3.
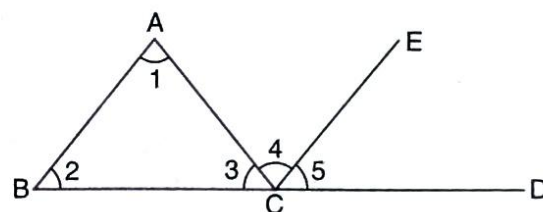

Fig. 6.3

Based on the above information, answer the following questions:

(i) BA ∥ CE and AC is the transverse line. Then ∠1 is equal to which angle ?

(a) ∠2   (b) ∠3   (c) ∠4   (d) ∠5

(ii) ∠2 is equal to which angle ?

(a) ∠2   (b) ∠3   (c) ∠4   (d) ∠5

(iii) What is the value of ∠3 + ∠4 + ∠5 ?

(a) 180°   (b) 120°   (c) 200°   (d) 360°

(iv) What is value of ∠ACD = ∠4 + ∠5 = ?

(a) ∠3 + ∠5   (b) ∠1 + ∠2

(c) ∠2 + ∠3   (d) ∠3 + ∠4

(*v*) What is value of $\angle 1 + \angle 2 + \angle 3$?

(*a*) 180°   (*b*) 360°

(*c*) 120°   (*d*) 200°

Answers

3. (*i*) → (*c*)   (*ii*) → (*d*)   (*iii*) → (*a*)   (*iv*) → (*b*)   (*v*) → (*a*)

4. Mr. Vishal a Mathematics teacher draws a straight line AB on the blackboard. He further draws the line CD (as in the figure) intersecting AB at O.

He also proceeds to mark $\angle AOD = 2z$, $\angle AOC = 4y$, $\angle BOD = x$ and $\angle DOE = y$.

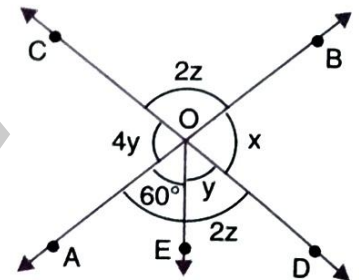Based on the above information, answer the following questions:

Fig. 6.4

(*i*) What is the value of x ?

(*a*) 60°   (*b*) 96°   (*c*) 100°   (*d*) 120°

(*ii*) What is the value of y ?

(*a*) 26°   (*b*) 24°   (*c*) 32°   (*d*) 36°

(*iii*) What is the value of z ?

(*a*) 42°   (*b*) 46°   (*c*) 38°   (*d*) 40°

(*iv*) What is the value of $x + 2z$?

(*a*) 120°   (*b*) 140°   (*c*) 180°   (*d*) 160°

(*v*) What is the relation between y and z ?

(*a*) $2y + z = 90°$ (*b*) $y + 2z = 90°$ (*c*) $y + z = 90°$ (*d*) $y - z = 90°$

Answers

4. (*i*) → (*b*)   (*ii*) → (*b*)   (*iii*) → (*a*)   (*iv*) → (*c*)   (*v*) → (*a*)

5. In Mathematics period of Class IX, the teacher wants to conduct a small quiz to solve a problem on the blackboard. She needs two students and a prize will be given to the student who solves the problem first. For this purpose, she selects a boy and a girl.

The geometrical problem is given on the blackboard as shown in the figure in which AB ∥ CD and AC = AO. Further angles are marked as depicted in Fig. 6.5.

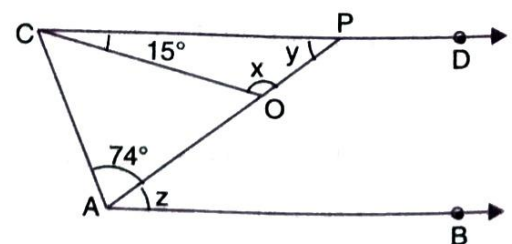Based on the above information, answer the following questions:

Fig. 6.5

(*i*) The measure of $\angle ACO$ is:

(*a*) 53°   (*b*) 57°   (*c*) 54°   (*d*) 55°

(ii) The measure of ∠ x is:

    (a) 123°   (b) 127°   (c) 117°   (d) 119°

(iii) The measure of ∠ y is:

    (a) 36°   (b) 40°   (c) 38°   (d) 34°

(iv) The measure of ∠ z is:

    (a) 34°   (b) 36°   (c) 40°   (d) 38°

(v) The measure of ∠ x + ∠ y + ∠ z is:

    (a) 180°   (b) 200°   (c) 203°   (d) 205°

Answers

5. (i) → (a)   (ii) → (b)   (iii) → (c)   (iv) → (d)   (v) → (c)

6. Four students of Class IX were selected for plantation of flower plants in the school garden. The selected students were Pankaj, Raju, Deepak and Renu. As shown PQ and MN are parallel lines of the plants. Pankaj planted a sunflower plant at P and then Raju planted another sunflower plant at Q. Further, Deepak was called to plant any flowering plant at M. He planted a marigold there. Now it was the turn of Renu who planted a rose flower plant at N. There was a water pipe line XY which intersects PQ and MN at B and A respectively.
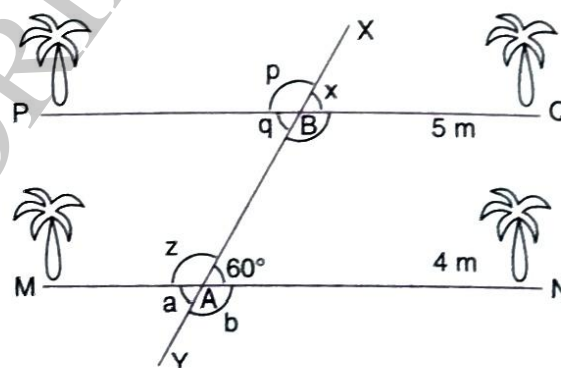

Fig. 6.6

Based on the above information, answer the following questions:

(i) The value of angle z is:

    (a) 60°   (b) 120°   (c) 180°   (d) 100°

(ii) The value of angle x is:

    (a) 60°   (b) 120°   (c) 180°   (d) 100°

(iii) The value of (p + q) is:

    (a) 60°   (b) 120°   (c) 180°   (d) 100°

(iv) Which angle is corresponding to angle ∠ a ?

    (a) p   (b) x   (c) z   (d) q

(v) The value of $\left(\dfrac{p+q+x+z}{6} \right)$ is:

    (a) 120°   (b) 60°   (c) 30°   (d) 90°

Answers

6. (i) → (b)   (ii) → (a)   (iii) → (c)   (iv) → (d)   (v) → (b)

7: TRIANGLES

1. There are five rods. One is of length $(a + b)$, two of length a and two of length b. These rods are arranged to form two equilateral triangles, as shown in the Fig. 7.1. PC and BQ are joined.
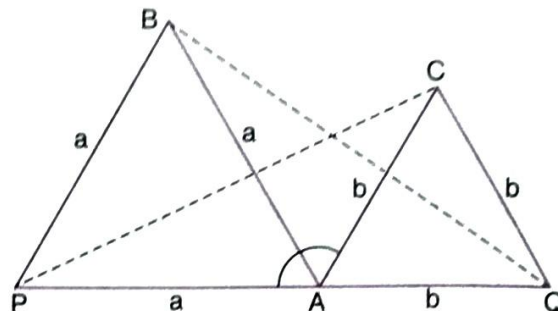
   Based on the above information, answer the following questions:

   (i) $\angle$ BAC =

   Fig. 7.1

   (a) 90°   (b) 80°   (c) 70°   (d) 60°

   (ii) In Δ's ABQ and PCA, PA = AB and AC = AQ. Which third condition exists there to make these two triangles congruent.

   (a) $\angle$ APC = $\angle$ AQB   (b) $\angle$ PAC = $\angle$ QAB

   (c) $\angle$ PCA = $\angle$ ABQ   (d) PC = BQ

   (iii) Δ ABQ $\cong$ Δ APC by which of the following Congruence conditions ?

   (a) SSS   (b) RHS   (c) ASA   (d) SAS

   (iv) Which of the following is not true ?

   (a) PC = BQ   (b) $\angle$ APC = $\angle$ AQB

   (c) $\angle$ ACP = $\angle$ AQB   (d) None of these

   (v) Which of the following is true ?

   (a) PB $\parallel$ AC   (b) AB $\parallel$ CQ

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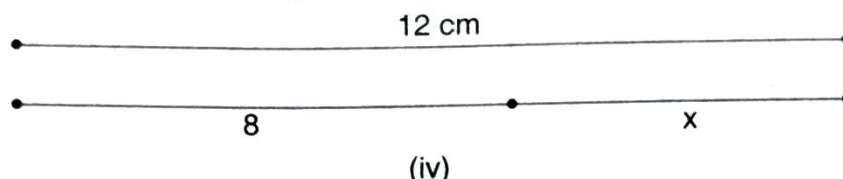
   Answers

   1. (i) $\rightarrow$ (d)   (ii) $\rightarrow$ (b)   (iii) $\rightarrow$ (d)   (iv) $\rightarrow$ (b)   (v) $\rightarrow$ (c)

2. Let us take a straw of length 12 cm another of length 8 cm. Let us keep these straws to form an angle lying between 0° and 180°. Now, we take a third straw of such a length x cm that it completes the triangle.
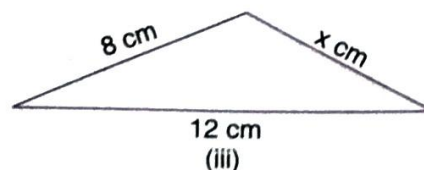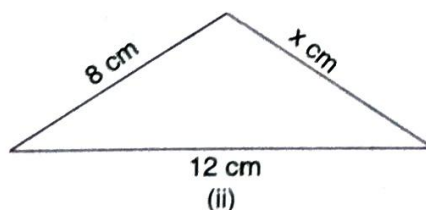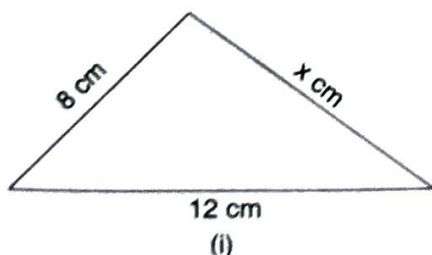
We observe that 8 + x > 12

If 8 + x = 12, then the straws get overlaped and triangle is not formed.

(iv)

Similarly, if x is chosen such that 8 + x < 12, then also the triangle is not formed.
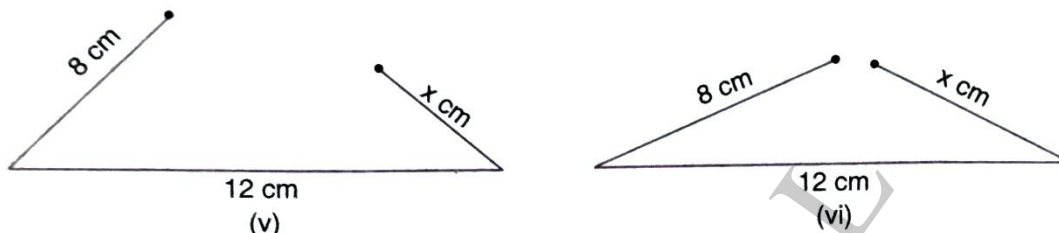

Fig. 7.2

Hence, we can conclude that to form a triangle sum of any two sides should be greater than the third side.

Based on the above information, answer the following questions:

(i) Two sides of a triangle are given by $a = 8$ cm, $b = 10$ cm. If c is the length of third side then for what value of c, $\triangle ABC$ is not possible

    (a) 5 cm   (b) 4 cm   (c) 3 cm   (d) 2 cm

(ii) In any triangle the absolute value of the difference of two sides is always

    (a) greater than the third side   (b) smaller than the third side

    (c) equal to the third side   (d) equal to half the third side

(iii) In each of the following cases, length of three sides of a triangle are given then in which case triangle is not possible ?

    (a) 9, 5, 6   (b) 18, 13, 6   (c) 7, 14, 5   (d) None of these

(iv) In $\triangle ABC$, AD is the median. Then perimeter of triangle is

    (a) greater than twice the median   (b) equal to twice the median

    (c) equal to thrice the median   (d) None of these

(v) In $\triangle ABC$, $\angle B > \angle C$, then

    (a) BC > AC   (b) AC > BC   (c) AC > AB   (d) AC = AB

Answers

2. (i) → (d)   (ii) → (b)   (iii) → (c)   (iv) → (a)   (v) → (c)

3. *Dharshan Pal has a farm in the shape of a right angled isosceles triangle ABC. One of his cows is suffering from some disease. To take good care of this cow, he tied her at one corner of the farm and did not take any work from that cow. The corner angle of the farm is right angle.*
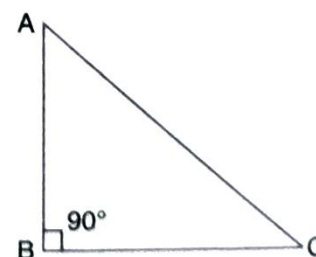

Fig. 7.3

Based on the above information, answer the following questions:

(i) The measure of ∠A is:

    (a) 30°   (b) 60°   (c) 45°   (d) 75°

(ii) The measure of ∠A is:

    (a) 30°   (b) 45°   (c) 60°   (d) 75°

(iii) The relation between AB and BC is:

    (a) AB < BC   (b) AB > BC   (c) AB = BC   (d) AB ≠ BC

(iv) The sum of measure (∠A + ∠C) is:

    (a) 60°   (b) 100°   (c) 90°   (d) 45°

(v) The relation between AB and AC is:

    (a) AB + BC = AC   (b) AB + BC < AC

    (c) AB < AC   (d) AB > AC

Answers

3. (i) → (c)   (ii) → (b)   (iii) → (c)   (iv) → (c)   (v) → (c)

8: QUADRILATERALS

1. *Rehaan and Sheaan are celebrating Republic Day by flying their kites high in the sky.*

   In Rehaan's kite ABCD, the diagonal AC bisects BD perpendicular at O, while in Sheaan's kite PQRS, both the diagonals PR and QS bisect each other at 90° as shown below in Fig. 8.1 (a) and (b) respectively:

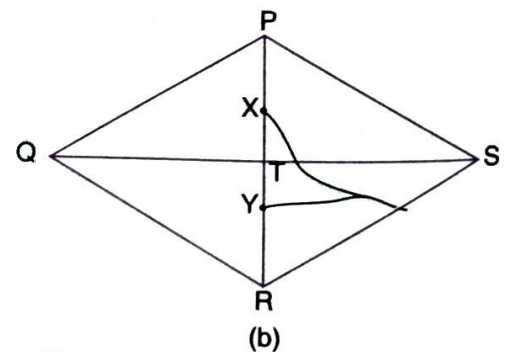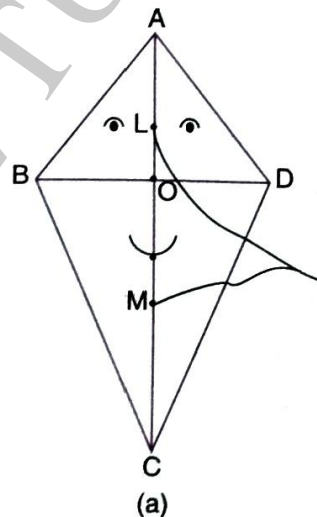   *Based on the above information, answer the following questions:*

Fig. 8.1

(i) What could be the possible shape of Sheaan's kite ?

    (a) Trapezium   (b) Rectangle   (c) Rhombus   (d) None of these

(ii) What could be the possible shape of Rehaan's kite ?

    (a) Trapezium   (b) Rectangle   (c) Rhombus   (d) None of these

(*iii*) If PR = QS, then Sheaan's kite will come in the shape of a

    (*a*) Square   (*b*) Rectangle   (*c*) Rhombus   (*d*) None of these

(*iv*) Which of the following is false about Rehaan's kite ?

    (*a*) AB = AD   (*b*) BC = DC   (*c*) BO = DO   (*d*) AO = CO

(*v*) If midpoints of sides of Sheaan's kite are joined, the quadrilateral obtained is a

    (*a*) Square   (*b*) Rhombus   (*c*) Rectangle   (*d*) None of these

Answers

    1. (*i*) → (*c*)   (*ii*) → (*d*)   (*iii*) → (*a*)   (*iv*) → (*d*)   (*v*) → (*a*)

2.   In Fig. 8.2, there is a door with a shedding. Door is a rectangle and the shedding is in shape of a trapezium.

    Beeding design on door consists of two entangled rhombus with a parallelogram inside. Also, corners of door are decorated using beeding to form shape of squares. Based on the above information, answer the following questions:
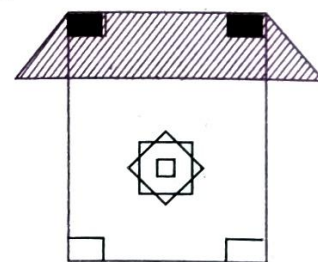

Fig. 8.2

  (*i*) Which of the following is true ?

    (*a*) a trapezium is a parallelogram   (*b*) a rectangle is a rhombus

    (*c*) a rhombus is a rectangle   (*d*) a parallelogram is a quadrilateral

 (*ii*) Which of the following is not true for a rhombus ?

    (*a*) diagonals bisect each other   (*b*) opposite sides are equal

    (*c*) opposite angles are equal   (*d*) diagonals are equal

(*iii*) Each angle of a quadrilateral is 90°, then which of the following is false about it ?

    (*a*) Its diagonals bisect each other   (*b*) Its opposite sides are equal

    (*c*) Its diagonals are equal   (*d*) None of these

(*iv*) Which of the following is not true ?

    (*a*) Area of a parallelogram = $\frac{1}{2}$ × base × corresponding altitude

    (*b*) Area of a rectangle = length × breadth

    (*c*) Area of a trapezium = $\frac{1}{2}$ (sum of parallel sides) × distance between them

    (*d*) None of these

 (*v*) If midpoints of sides of a rectangle are joined, the quadrilateral obtained is a

    (*a*) square   (*b*) rhombus   (*c*) rectangle   (*d*) None of these

Answers

    2. (*i*) → (*d*)   (*ii*) → (*d*)   (*iii*) → (*d*)   (*iv*) → (*a*)   (*v*) → (*b*)

9: CIRCLES

1. *Ram Lal is a designer for printing. He wishes to make a geometrical design, as shown in Fig. 9.1, for block printing. O is the centre of the circle.*

   Chords AG and BC are perpendicular intersecting each other at 90°. OD is a radius of circle perpendicular to AG. BD and OC intersect each other at F. $\angle GOC = 60°$. (See Fig. 9.1).

   Based on the above information, answer the following questions:

Fig. 9.1

(i) $\angle COD =$

    (a) 30°
    (b) 60°

    (c) 45°
    (d) 15°

(ii) $\angle CBG =$

    (a) 15°
    (b) 30°
    (c) 45°
    (d) 60°

(iii) $\angle CBD =$

    (a) 15°
    (b) 30°
    (c) 45°
    (d) 60°

(iv) $\angle ABD =$

    (a) 15°
    (b) 30°
    (c) 45°
    (d) 60°

(v) $\angle ODB =$

    (a) 15°
    (b) 30°
    (c) 45°
    (d) 60°

Answers

1. (i) → (a)   (ii) → (b)   (iii) → (a)   (iv) → (c)   (v) → (a)

2. *Harsh draws a circle of any radius, say r with centre O. Then, he draws a chord AB of length l which divides it into two segments. (See Fig. 9.2)*

   Based on the above information, answer the following questions:

Fig. 9.2

(i) If $OM \perp AB$, then $AM =$

    (a) $\dfrac{l}{2}$
    (b) $\dfrac{l}{3}$
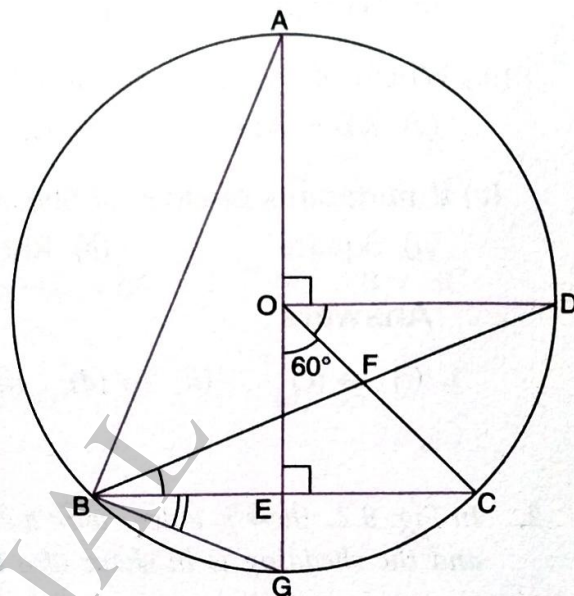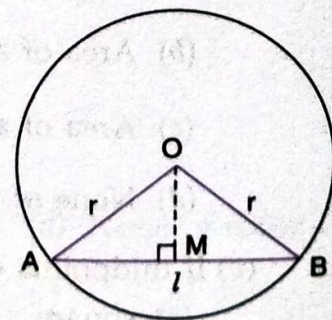
    (c) $\dfrac{l}{\sqrt{2}}$
    (d) $\dfrac{l}{\sqrt{3}}$

(ii) If there is another chord XY with ON ⊥ XY and OM = ON, then

(a) AB > XY   (b) AB < XY   (c) AB = XY

(d) No relation can be determined between lengths of two chords

(iii) If $r = \sqrt{2}$ and $l = 2$ and P is a point on circle in major segment then ∠ APB =

(a) 15°   (b) 30°   (c) 45°   (d) 60°

(iv) If $r = l$ and P is a point on circle in minor segment then, ∠ APB =

(a) 130°   (b) 160°   (c) 120°   (d) 150°

(v) Which of the following is false ?

(a) Equal chords subtend equal angles at the centre

(b) Equal chords are equidistant from centre

(c) Equal chords are parallel

(d) If AB = AC, then AO bisects angle between two chords AB and AC.

Answers

2. (i) → (a)   (ii) → (c)   (iii) → (c)   (iv) → (d)   (v) → (c)

3. Monika wishes to organise a party in MK International Hotel, Amritsar. Direction arrows in the party are as shown in Fig. 9.3, wherein chords AB and CF, when produced, meet each other at E. Also, the chords AC and BF, when produced meet each other at D.

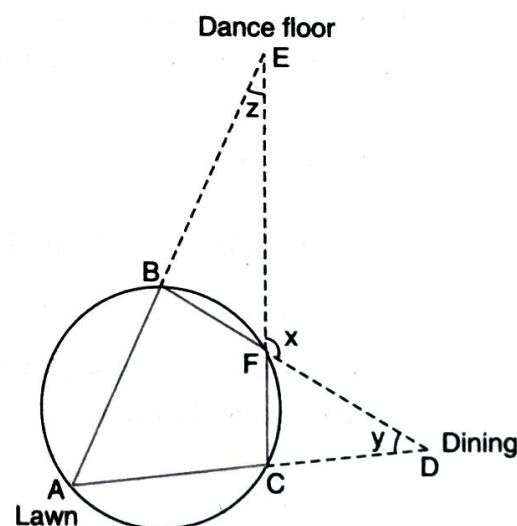Based on the above information, answer the following questions:

Fig. 9.3

(i) Angle A, directing towards lawn, is given by

(a) x (b) $90° + x$

(c) $180 - x$ (d) None of these

(ii) Angle D, directing towards dining, is given by

(a) $y = x - ∠ABF$ (b) $y = x - ∠ACF$ (c) $y = x - 90°$ (d) None of these

(iii) Angle E, directing towards Dance Floor, is given by

(a) $z = x - 90°$ (b) $z = x - ∠A$ (c) $z = x - ∠ABF$ (d) $z = x - ∠ACF$

(iv) Relation between x, y and z is

(a) $x + y + z = 180°$ (b) $\dfrac{y+z}{2} = x - 90°$ (c) $x = y + z$ (d) None of these

(v) If $y = z = 30°$, then $x =$

(a) 120°　　　　(b) 60°　　　　(c) 150°　　　　(d) None of these

Answers

3. (i) → (c)　　(ii) → (a)　　(iii) → (d)　　(iv) → (b)　　(v) → (a)

10: AREA OF TRIANGLES – HERON'S FORMULA

1. A block in the shape of a regular hexagon is formed for block printing. As complete angle at O is divided into 6 equal parts, each triangle with vertex at O should be an equilateral triangle (See Fig. 10.1).

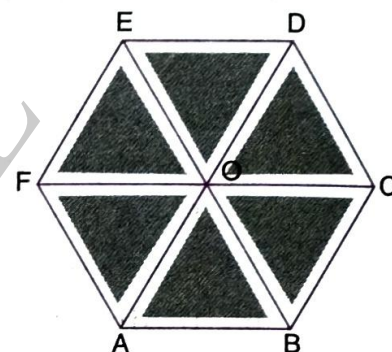Based on the above information, answer the following questions:

(i) If side of regular hexagon is 6 cm, what is the area of block ABCDEF ?

(a) $54\sqrt{3}$ cm^2　　　　(b) 54 cm^2

(c) $108\sqrt{3}$ cm^2　　　　(d) 108 cm^2

Fig. 10.1

(ii) The triangles insides the equilateral triangles are also equilateral and embossed. If side of each interior embossed equilateral triangle is 5 cm, the unembossed area is

(a) $6\sqrt{3}$ cm^2　　(b) $\dfrac{33\sqrt{3}}{4}$ cm^2　　(c) $\dfrac{11\sqrt{3}}{2}$ cm^2　　(d) $\dfrac{33\sqrt{3}}{2}$ cm^2

(iii) An isosceles right triangle has area 18 cm^2. The length of hypotenuse is

(a) 6 cm　　(b) $6\sqrt{2}$ cm　　(c) 9 cm　　(d) $9\sqrt{2}$ cm

(iv) The area of an isosceles triangle having base 2 cm and the length of one of the equal sides 4 cm, is

(a) $\sqrt{15}$ cm^2　　(b) $\sqrt{\dfrac{15}{2}}$ cm^2　　(c) $2\sqrt{15}$ cm^2　　(d) $4\sqrt{15}$ cm^2

(v) The sides of a triangle are 35 cm, 54 cm and 61 cm respectively. The length of its longest altitude is

(a) $16\sqrt{5}$ cm　　(b) $10\sqrt{5}$ cm　　(c) $24\sqrt{5}$ cm　　(d) 28 cm

Answers

1. (i) → (a)　　(ii) → (d)　　(iii) → (b)　　(iv) → (a)　　(v) → (c)

2. Saloni has a residential rectangular plot ABCD of dimensions 51 m × 25 m. It is divided into two parts by a line PQ, such that QC : PD = 9 : 8 and Ar (PQCD) = $\dfrac{5^{th}}{6}$ of area of rectangular plot ABCD (See Fig. 10.2).

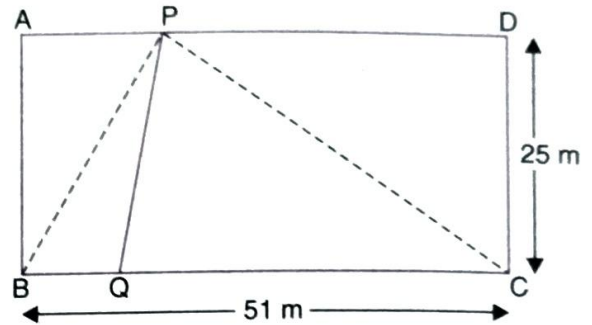Based on the above information, answer the following questions:

Fig. 10.2

(i) Area of rectangle ABCD is:

(a) 1275 m^2 (b) 1265 m^2 (c) 1365 m^2 (d) 1375 m^2

(ii) Area of part APQB is:

(a) 211 m^2 (b) 212.5 m^2 (c) 222.5 m^2 (d) None of these

(iii) The ordered pair (QC, PD) is:

(a) (27, 24)   (b) (36, 32)   (c) (45, 40)   (d) None of these

(iv) Ar (Δ PBC) is:

(a) 647.5 m^2 (b) 682.5 m^2

(c) 632.5 m^2 (d) 637.5 m^2

(v) The area of the trapezium PQRS in Fig. 10.3 is:

(a) 114 m^2 (b) 112 m^2

(c) 124 m^2 (d) 134 m^2
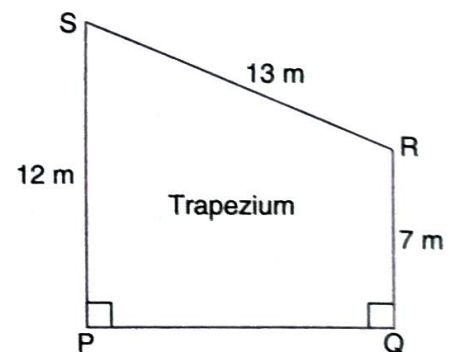
Fig. 10.3

Answers

2. (i) → (a)   (ii) → (b)   (iii) → (c)   (iv) → (d)   (v) → (a)

3. Students of a Central School staged a rally for cleanliness campaign. They walked through the lanes in two groups. One group walked through the lanes AB, BC and CA, while the other through AC, CD and DA (See Fig. 10.4). Then they cleaned the area within their lanes.
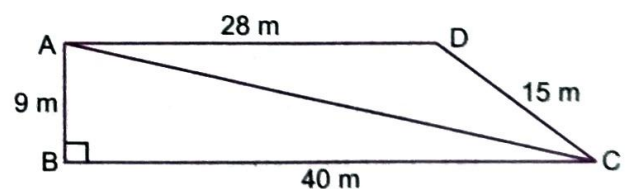
Fig. 10.4

And, the lanes measured AB = 9 m, BC = 40 m, CD = 15 m, DA = 28 m, with ∠B = 90°.

Based on the above information, answer the following questions:

(i) Then, the length of AC is:

(a) 41 m   (b) 42 m   (c) 45 m   (d) None of these

(ii) Area of Δ ABC is:

(a) 185 m^2 (b) 183 m^2 (c) 180 m^2 (d) None of these

(iii) Semi-perimeter of Δ ACD is:

   (a) 40 m   *(b)* 42 m   *(c)* 48 m   *(d)* None of these

(iv) Area of Δ ACD is:

   (a) 124 m^2 *(b)* 125 m^2 *(c)* 126 m^2 *(d)* 120 m^2

(v) Total area cleaned by all the students is:

   (a) 306 m^2 *(b)* 305 m^2 *(c)* 304 m^2 *(d)* 300 m^2

Answers

3. *(i)* → *(a)*   *(ii)* → *(c)*   *(iii)* → *(b)*   *(iv)* → *(c)*   *(v)* → *(a)*

4. *Mrs. Gill, a woman farmer has a triangular field with sides 240 m, 200 m, 360 m, where she grew wheat. In another triangular field with sides 240 m, 320 m, 400 m adjacent to the previous field, she wanted to grow potatoes and onions (See Fig. 10.5). She divided the field in two parts by joining the mid-point of the longest side to the opposite vertex and grew potatoes in one part and onions in the other part.*
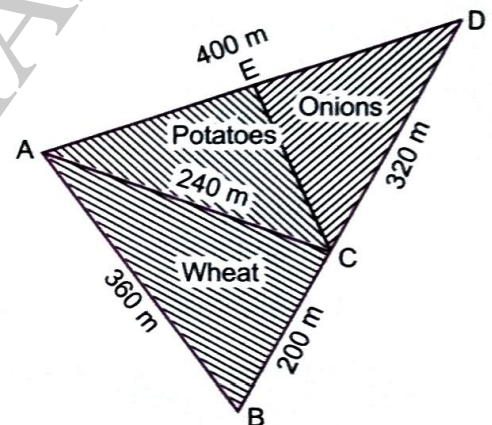
Based on the above information, answer the following questions:

Fig. 10.5

 (i) Area for growing wheat is:

   (a) 2.25 hectares   *(b)* 2.26 hectares

   (c) 2.30 hectares   *(d)* None of these

(ii) Area of Δ ACD is:

   (a) 3.84 hectares   *(b)* 3.90 hectares

   (c) 3.95 hectares   *(d)* None of these

(iii) Area for growing potatoes is:

   (a) 1.90 hectares   *(b)* 1.92 hectares

   (c) 1.95 hectares   *(d)* None of these

(iv) Area for growing onions is:

   (a) 2.00 hectares   *(b)* 1.95 hectares

   (c) 1.92 hectares   *(d)* None of these

(v) Total area cultivated is:

   (a) 6.10 hectares   *(b)* 6.00 hectares

   (c) 6.20 hectares   *(d)* None of these

Answers

4. *(i)* → *(b)*   *(ii)* → *(a)*   *(iii)* → *(b)*   *(iv)* → *(c)*   *(v)* → *(a)*.

5. Rohan made an arrangement with red and grey coloured paper sheets. Dimensions of the four parts of the paper are as shown in Fig. 10.6:
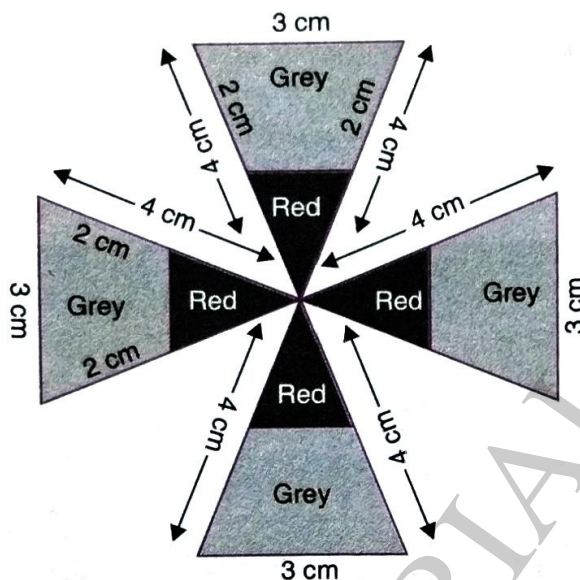
Fig. 10.6

Based on the above information, answer the following questions:

(i) Base of red triangle is:

(a) $\dfrac{3}{2}$ cm　　　　(b) $\dfrac{5}{2}$ cm　　　　(c) $\dfrac{1}{2}$ cm　　　　(d) $\dfrac{7}{2}$ cm

(ii) Area of one grey and red triangle is:

(a) $\dfrac{1}{4}\sqrt{55}$ cm^2　　(b) $\dfrac{3}{4}\sqrt{55}$ cm^2　　(c) $\dfrac{1}{2}\sqrt{55}$ cm^2　　(d) $\dfrac{2}{5}\sqrt{55}$ cm^2

(iii) Area of one red triangle is:

(a) $\dfrac{5}{16}\sqrt{55}$ cm^2　　(b) $\dfrac{3}{4}\sqrt{55}$ cm^2　　(c) $\dfrac{3}{16}\sqrt{55}$ cm^2　　(d) $\dfrac{3}{8}\sqrt{55}$ cm^2

(iv) Area of grey part is:

(a) $\dfrac{9}{4}\sqrt{55}$　　　　(b) $\dfrac{9}{2}\sqrt{55}$　　　　(c) $\dfrac{7}{4}\sqrt{55}$　　　　(d) $\dfrac{5}{4}\sqrt{55}$

(v) Ratio of area of red part : area of grey part is:

(a) 1 : 2　　　　(b) 1 : 12　　　　(c) 1 : 4　　　　(d) 1 : 9

Answers

5. (i) → (a)　　(ii) → (b)　　(iii) → (c)　　(iv) → (a)　　(v) → (b)

11: SURFACE AREAS AND VOLUMES

1. *Mathematics teacher of a school took her 10th standard students to show Red fort. It was a part of their Educational trip. The teacher had interest in history as well. She narrated the facts of Red fort to students. Then the teacher said in this monument one can find combination of solid figures. There are 2 pillars which are cylindrical in shape. Also, 2 domes at the corners which are hemispherical and 7 smaller domes at the centre. Flag hoisting ceremony on Independence Day takes place near these domes.*
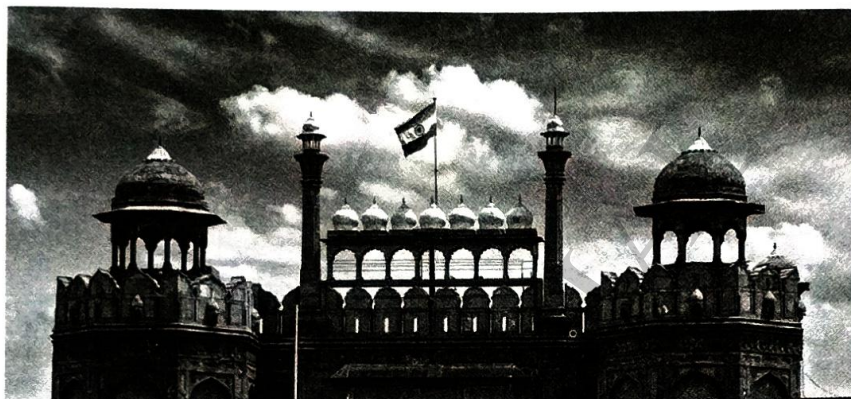

Fig. 11.1

Based on the above information, answer the following questions:

(i) How much cloth material will be required to cover 2 big domes each of radius 2.5 metres ? (Take $\pi = 22/7$)

    (a) 75 m^2 (b) 78.57 m^2 (c) 87.47 m^2 (d) 25.8 m^2

(ii) Write the formula to find the volume of a cylindrical pillar.

    (a) $\pi r^2 h$ (b) $\pi r l$ (c) $\pi r(l + r)$ (d) $2\pi r$

(iii) Find the lateral surface area of two pillars if height of the pillar is 7 m and radius of the base is 1.4 m.

    (a) 112.3 cm^2 (b) 123.2 m^2 (c) 90 m^2 (d) 345.2 cm^2

(iv) How much is the volume of a hemisphere if the radius of the base is 3.5 m ?

    (a) 85.9 m^3 (b) 80 m^3 (c) 98 m^3 (d) 89.83 m^3

(v) What is the ratio of sum of volumes of two hemispheres of radius 1 cm each to the volume of a sphere of radius 2 cm ?

    (a) 1 : 1   (b) 1 : 8   (c) 8 : 1   (d) 1 : 16

Answers

1. (i) → (b)   (ii) → (a)   (iii) → (b)   (iv) → (d)   (v) → (b)

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CASE STUD   CS.27

2. The 2022 Commonwealth Games, officially known as the XXII Commonwealth Games and commonly known as, Birmingham 2022, is an international multi-sport event for members of the commonwealth countries, that is scheduled to be held in Birmingham, England (United Kingdom) from 28 July, 2022 to

Fig. 11.2

8 Aug., 2022. Organisers of the event decided to have victory stands for players as shown in the following figure. Each face of the victory stand is rectangular and all measurements shown are in centimeters. Based on the above information, answer each of the following questions:
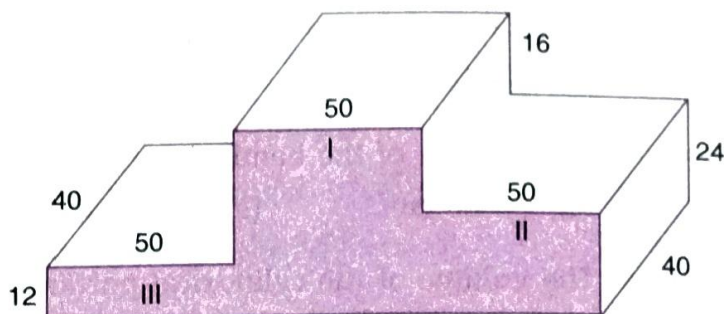
(i) The surface area of the front face of the victory stand is

     (a) 2400 cm^2 (b) 1800 cm^2 (c) 3200 cm^2 (d) 3800 cm^2

(ii) The total surface area of the victory stand is

     (a) 16,800 cm^2 (b) 22,800 cm^2 (c) 15,800 cm^2 (d) 15,200 cm^2

(iii) The volume of the box designated for the player ranking third in the competition is

     (a) 20,000 cm^3 (b) 24,000 cm^3 (c) 48,000 cm^3 (d) 36,000 cm^3

(iv) The volume of the box designated for the player ranking second in the competition is

     (a) 48,000 cm^3 (b) 36,000 cm^3 (c) 46,000 cm^3 (d) 4,000 cm^3

(v) The volume of the box designated for the winner is

     (a) 68,000 cm^3 (b) 60,000 cm^3 (c) 80,000 cm^3 (d) 70,000 cm^3

Answers

2. (i) → (d)   (ii) → (b)   (iii) → (b)   (iv) → (a)   (v) → (c)

3. A metal-smith wants to make a vessel in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the hemispherical part is 42 cm and the total height of the vessel is 63 cm. Vessel is open on the top.

Based on the above information, answer the following questions:

Fig. 11.3

(i) The outer surface area of the hemispherical part, neglecting the thickness of the metal, is

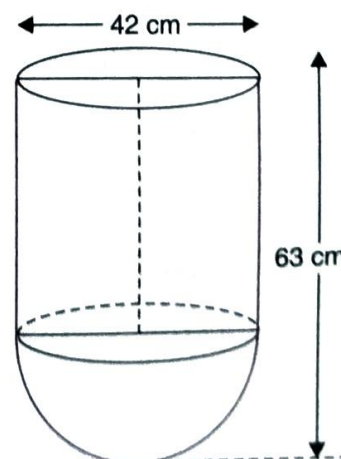   (a) 19404 cm^2 (b) 38808 cm^2

     (c) 58212 cm^2 (d) 2772 cm^2

(ii) The outer surface area of the cylindrical part of the vessel is

    (a) 5544 cm^2 *(b)* 29106 cm^2 *(c)* 38808 cm^2 *(d)* 19404 cm^2

(iii) The volume of the hemispherical part of the vessel, is

    (a) 38808 cm^3 *(b)* 19404 cm^3 *(c)* 58212 cm^3 *(d)* 29106 cm^3

(iv) The volume of the cylindrical portion of the vessel, is

    (a) 116424 cm^3 *(b)* 5544 cm^3 *(c)* 19404 cm^3 *(d)* 58212 cm^3

(v) The total surface area of the vessel is

    (a) 8316 cm^2 *(b)* 58212 cm^2 *(c)* 5544 cm^2 *(d)* 19404 cm^2

Answers

3. *(i)* → *(d)*   *(ii)* → *(a)*   *(iii)* → *(b)*   *(iv)* → *(d)*   *(v)* → *(a)*

4. *A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The diameter of each of the depression is 1 cm and the depth is 1.4 cm. Based on the above information, answer the following questions:*
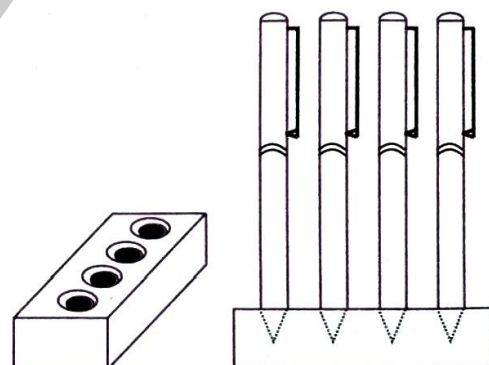
(i) The volume of the cuboid is

    (a) 225 cm^3 *(b)* 550 cm^3

    (c) 525 cm^3 *(d)* 625 cm^3

Fig. 11.4

(ii) The volume of the conical depression is

    (a) $\dfrac{11}{30}$ cm^3 *(b)* $\dfrac{11}{15}$ cm^3 *(c)* $\dfrac{11}{60}$ cm^3 *(d)* $\dfrac{30}{11}$ cm^3

(iii) The volume of the wood in the stand is

    (a) 525 cm^3 *(b)* 523.53 cm^3 *(c)* 532.53 cm^3 *(d)* 523.35 cm^3

(iv) The surface area of the cuboid is

    (a) 450 cm^2 *(b)* 575 cm^2 *(c)* 457 cm^2 *(d)* 475 cm^2

(v) The surface area of four conical cavities is

    (a) 8.28 cm^2 *(b)* 9.30 cm^2 *(c)* 9.82 cm^2 *(d)* 9.18 cm^2

Answers

4. *(i)* → *(c)*   *(ii)* → *(a)*   *(iii)* → *(b)*   *(iv)* → *(d)*   *(v)* → *(b)*

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CASE STUDY/S   □ JSUNIL SIR 9635059669   CS.29

5. Bunny is a very observant child. One day he went to attend a party with his parents. There he noticed the following:

- Circular plates were piled up to form a right circular cylinder.
- Ice cream was kept in a cubical box and a person was putting it into small cones.
- There was a stall of sweets where spherical laddoos were kept.
- Deepak is very fond of eating laddoos.

(i) If 100 circular plates of radius 7 cm and thickness $\frac{1}{2}$ cm each are placed one above the other, what is the volume of the cylinder thus formed ?

    (a) 7000 cm^3 (b) 7700 cm^3 (c) 3500 cm^3 (d) None of these

(ii) What is the area of cardboard used in making cubical ice cream box of edge 20 cm when it is known that 20% extra cardboard is used for flaps ?

    (a) 1920 cm^2 (b) 2000 cm^2 (c) 1440 cm^2 (d) 2880 cm^2

(iii) If each cone is of height 7 cm and radius 3 cm, how much ice cream it will hold ?

    (a) 120 cm^3 (b) 66 cm^3 (c) 60 cm^3 (d) 132 cm^3

(iv) How many such cones can be completely filled with ice cream ?

    (a) 121   (b) 122   (c) 120   (d) None of these

(v) There was a laddoo of radius 5 cm. With the same amount of material how many laddoos of radius 2.5 cm can be made ?

    (a) 2   (b) 4   (c) 6   (d) 8

Answers

5. (i) → (b)   (ii) → (d)   (iii) → (b)   (iv) → (a)   (v) → (d)

12: STATISTICS

1. A Maths teacher tells her students that a measure of central tendency or central location is a single value that attempts to describe a set of data by identifying the central position within that set of data.

   The mean, median and mode are all valid measures of central tendency. But under different conditions, some measure of central tendency become more appropriate to use than others.

   An important property of mean is that it includes every value in the data set as part of the calculation. However it is not often one of the actual values of observations, gives in data set. When some observations in a data set are very small or very large as compared to others than mean might not be the best way to accurately reflect the central value of given data set.

   The median is less affected by very small or very large observations.

Normally, the mode is used for categorical data where we wish to know which is the most common category. However one of the problems with the mode is that it is not unique. So it leaves us with problems when we have two or more values that share the highest frequency.

Based on the above information, answer the following questions:

(i) The mean of 5, 10, 15, 20, 25 is

  (a) 14   (b) 15   (c) 16   (d) 17

(ii) The median of 9, 5, 7, 11, 13, 3 is

  (a) 8   (b) 9   (c) 7   (d) 11

(iii) The mode of the series 2, 3, 1, 2, 5, 3, 2, 2, 3, 5 is

  (a) 5   (b) 1   (c) 2   (d) 3

(iv) For the given bar graph, which measure of central tendency is not appropriate

  (a) Mean   (b) Median

  (c) Mode   (d) None of these

(v) The marks scored (out of 100) by 10 students of a class are given below:

5, 9, 7, 13, 15, 2, 12, 20, 95, 99.

Which measure of central tendency will give misleading information ?

  (a) Mean   (b) Median
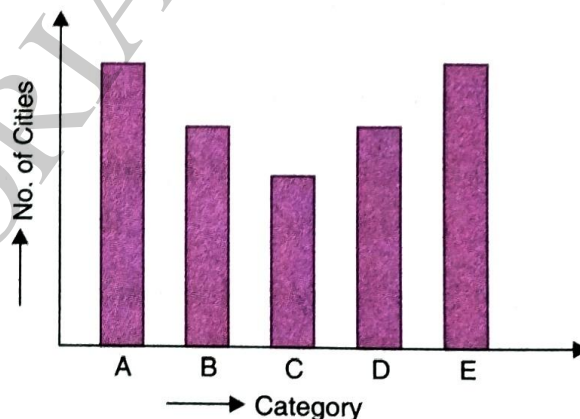
  (c) Mode   (d) None of these

Fig. 12.1

Answers

1. (i) → (b)   (ii) → (a)   (iii) → (c)   (iv) → (c)   (v) → (a)

2. In an orchard the heights of some trees are recorded as shown in the table given below:

Heights of trees (in cm)	No. of trees
150 – 153	7
154 – 157	7
158 – 161	15
162 – 165	10
166 – 169	5
170 – 173	6

Convert it into a continuous grouped frequency distribution and using it, answer the following questions:

(i) Limits of third class will change to

   (a) 158.5 – 162.5   (b) 158.5 – 161.5   (c) 157.5 – 161.5   (d) 157.5 – 160.5

(ii) In which interval would 153.5 be included ?

   (a) First   (b) Second   (c) Third   (d) None of these

(iii) What is the class mark of fourth class interval ?

   (a) 162   (b) 165   (c) 163.5   (d) None of these

(iv) What is the difference between upper limits of the first and the fifth class intervals ?

   (a) 10   (b) 12   (c) 14   (d) 16

(v) What is the range of given data ?

   (a) 22   (b) 23   (c) 24   (d) 25

Answers

2. (i) → (c)   (ii) → (b)   (iii) → (c)   (iv) → (d)   (v) → (c)

❑❑❑