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PRACTICE PAPER 01 (2023-24)
PERIMETER AND AREA & ALGEBRAIC EXPRESSIONS
(ANSWERS)

SUBJECT: MATHEMATICS

MAX. MARKS : 40

CLASS : VII

DURATION : 1½ hr

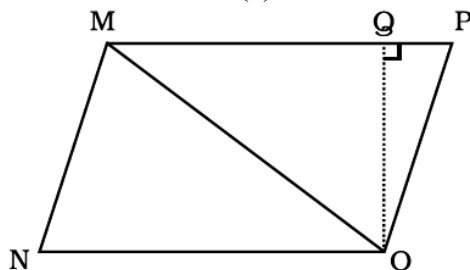
General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). **Section A** comprises of 6 MCQs of 1 mark each. **Section B** comprises of 1 CCT question of 4 marks each which contains 4 MCQs. **Section C** comprises of 3 questions of 2 marks each. **Section D** comprises of 4 questions of 3 marks each and **Section E** comprises of 3 questions of 4 marks each.

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. Ratio of area of $\triangle MNO$ to the area of parallelogram $MNOP$ in the below figure is
(a) 2 : 3 (b) 1 : 1 (c) 1 : 2 (d) 2 : 1



Ans: (c) 1 : 2

From the figure, Area of $\triangle MNO = \frac{1}{2} \times \text{base} \times \text{height} = \frac{1}{2} \times NO \times OQ$

Area of parallelogram $MNOP = \text{base} \times \text{corresponding height}$
 $= MP \times OQ = NO \times OQ \dots$ [from the figure $MP = NO$]

Then, ratio of parallelogram and triangle $= (\frac{1}{2} \times NO \times OQ) / (NO \times OQ) = 1/2 = 1 : 2$

2. A wire is bent to form a square of side 22 cm. If the wire is rebent to form a circle, its radius is
(a) 22 cm (b) 14 cm (c) 11 cm (d) 7 cm

Ans: (b) 14 cm

From the question it is given that, side of square is 22 cm and also, perimeter of a square and circumference of circle are equal, because the length of the wire is same.

Perimeter of square = circumference of circle

$$\Rightarrow 4 \times \text{side} = 2 \times \pi \times r \Rightarrow 4 \times 22 = 2 \times (22/7) \times r$$

$$\Rightarrow r = (4 \times 22 \times 7) / (2 \times 22) \Rightarrow r = 14 \text{ cm}$$

3. Area of a rectangle and the area of a circle are equal. If the dimensions of the rectangle are 14cm \times 11 cm, then radius of the circle is
(a) 21 cm (b) 10.5 cm (c) 14 cm (d) 7 cm.

Ans: (d) 7 cm

From the question it is given that, dimensions of rectangle length = 14 cm, breadth = 11 cm

As area of rectangle = area of circle

$$\Rightarrow \text{length} \times \text{breadth} = \pi r^2 \Rightarrow 14 \times 11 = (22/7) \times r^2$$

$$\Rightarrow r^2 = (14 \times 11 \times 7) / 22 \Rightarrow r^2 = 49 \Rightarrow r = \sqrt{49} \Rightarrow r = 7 \text{ cm}$$

4. Identify the binomial out of the following:

(a) $3xy^2 + 5y - x^2y$ (b) $x^2y - 5y - x^2y$ (c) $xy + yz + zx$ (d) $3xy^2 + 5y - xy^2$

Ans: (d) $3xy^2 + 5y - xy^2$

Expression with two unlike terms is called a 'Binomial'.

The expression $3xy^2 + 5y - xy^2$ is further simplified as,
 $= 3xy^2 + 5y - xy^2 = (3xy^2 - xy^2) + 5y = 2xy^2 + 5y$

5. The sum of the coefficients in the monomials $3a^2b$ and $-2ab^2$ is
 (a) 5 (b) -1 (c) 1 (d) 6

Ans: (c) 1

Since, the coefficient in the monomial $3a^2b$ is 3 and the coefficient in the monomial $-2ab^2$ is -2.

So, the sum of the coefficients in the monomials $3a^2b$ and $-2ab^2 = 3 + (-2) = 3 - 2 = 1$

6. The sum of the values of the expression $2x^2 + 2x + 2$ when $x = -1$ and $x = 1$ is
 (a) 6 (b) 8 (c) 4 (d) 2

Ans: (b) 8

Since, when $x = -1$, the value of the expression $2x^2 + 2x + 2 = 2(-1)^2 + 2(-1) + 2 = 2 - 2 + 2 = 2$

And, when $x = 1$, the value of the expression $2x^2 + 2x + 2 = 2(1)^2 + 2(1) + 2 = 2 + 2 + 2 = 6$

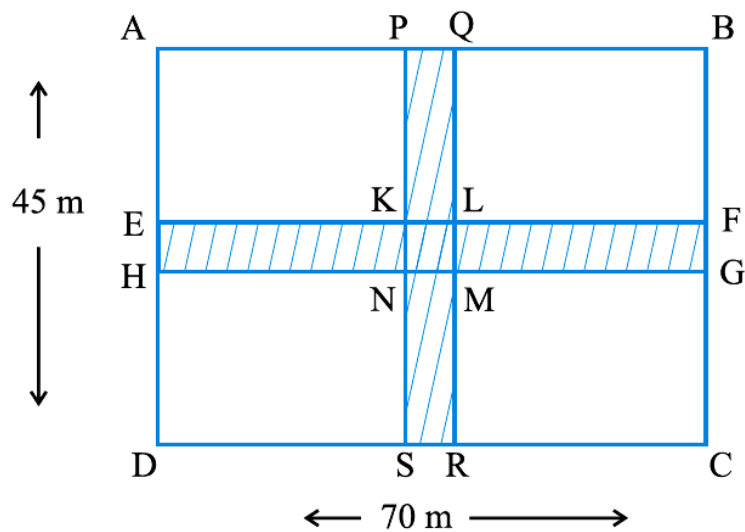
So, the sum of the values of the expression $2x^2 + 2x + 2$ when $x = -1$ and $x = 1 = 2 + 6 = 8$

SECTION – B(CCT Questions)

Questions 7 to 10 carry 1 mark each.

CCT Question

In Gulmohar colony, two cross roads, each of width 5 m, run at right angles through the centre of a rectangular park of length 70 m and breadth 45 m and parallel to its sides. Ram is a student of Class VII residing in Gulmohar park. One day he has taken all the measurements and drawn a rough diagram of two cross roads as shown in below figure:



Answer the following questions based on the above information:

7. Find the Area of the rectangle PQRS
 (a) 225 m^2 (b) 350 m^2 (c) 25 m^2 (d) 550 m^2
 Ans: (a) 225 m^2
8. Find the Area of the rectangle EFGH
 (a) 225 m^2 (b) 350 m^2 (c) 25 m^2 (d) 550 m^2
 Ans: (b) 350 m^2
9. Find the Area of the Square KLMN
 (a) 225 m^2 (b) 350 m^2 (c) 25 m^2 (d) 550 m^2
 Ans: (c) 25 m^2
10. Find the area of the road.
 (a) 225 m^2 (b) 350 m^2 (c) 25 m^2 (d) 550 m^2
 Ans: (d) 550 m^2

SECTION – C

Questions 11 to 13 carry 2 marks each.

11. Find the area of a circle whose diameter is 8.4 cm

Ans: Let r be the radius of the circle. Then, $r = 8.4 \div 2 = 4.2$ cm.

\therefore Area of the circle = πr^2

$$\Rightarrow A = \frac{22}{7} \times (4.2)^2 \text{ cm}^2$$

$$\Rightarrow A = \frac{22}{7} \times 4.2 \times 4.2 \text{ cm}^2 = (22 \times 0.6 \times 4.2) \text{ cm}^2 = 55.44 \text{ cm}^2$$

12. The circumference of a circle is 3.14 m, find its area.

Ans: We have Circumference of the circle = $3.14 = 2\pi r$

$$\Rightarrow 3.14 \text{ m} = \left(2 \times \frac{22}{7} \times r \right) \text{ m} \Rightarrow r = \frac{3.14 \times 7}{2 \times 22} \text{ m} = \frac{1}{2} \text{ m}$$

\therefore Area of the circle = πr^2

$$\Rightarrow A = \frac{22}{7} \times \left(\frac{1}{2} \right)^2 \text{ m}^2$$

$$\Rightarrow A = \left(\frac{22}{7} \times \frac{1}{2} \times \frac{1}{2} \right) \text{ m}^2 = \frac{22}{28} \text{ m}^2 = 0.785 \text{ m}^2$$

13. Find the value of the following expressions for $a = 3$, $b = 2$.

(i) $a + b$ (ii) $7a - 4b$ (iii) $a^2 + 2ab + b^2$ (iv) $a^3 - b^3$

Ans: Substituting $a = 3$ and $b = 2$ in

(i) $a + b$, we get $a + b = 3 + 2 = 5$

(ii) $7a - 4b$, we get

$$7a - 4b = 7 \times 3 - 4 \times 2 = 21 - 8 = 13.$$

SECTION – D

Questions 14 to 17 carry 3 marks each.

14. In the given figure, ABCD is a parallelogram, $CE \perp AB$ and $BF \perp AD$. If $AB = 12$ cm, $AD = 10$ cm and $CE = 8$ cm, find BE.

Ans:

Area of $\parallel\text{gm } ABCD$

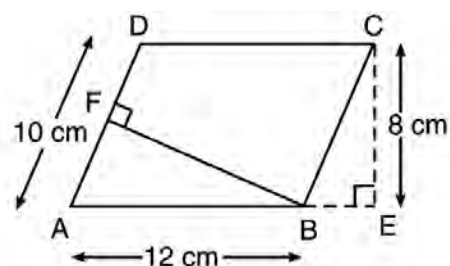
$$= \text{Base} \times \text{Altitude} = AB \times CE \quad \dots(i)$$

$$= 12 \text{ cm} \times 8 \text{ cm} = 96 \text{ cm}^2$$

Also, area of $\parallel\text{gm } ABCD = AD \times BF = 10 \times BF \quad \dots(ii)$

From (i) and (ii) $10 \times BF = 96$

$$\therefore BF = \frac{96}{10} \text{ cm} = 9.6 \text{ cm}.$$



15. Find the value of the following expressions when $n = -2$.

(i) $5n - 2$ (ii) $5n^2 + 5n - 2$ (iii) $n^3 + 5n^2 + 5n - 2$

Ans: (i) Putting the value of $n = -2$, in $5n - 2$, we get,

$$5(-2) - 2 = -10 - 2 = -12$$

(ii) In $5n^2 + 5n - 2$, we have,

$$\text{for } n = -2, 5n - 2 = -12$$

$$\text{and } 5n^2 = 5 \times (-2)^2 = 5 \times 4 = 20 \text{ [as } (-2)^2 = 4]$$

$$\text{Combining, } 5n^2 + 5n - 2 = 20 - 12 = 8$$

(iii) Now, for $n = -2$,
 $5n^2 + 5n - 2 = 8$ and
 $n^3 = (-2)^3 = (-2) \times (-2) \times (-2) = -8$
 Combining, $n^3 + 5n^2 + 5n - 2 = -8 + 8 = 0$

16. Identify terms which contain y^2 and give the coefficient of y^2 .

(i) $8 - xy^2$ (ii) $5y^2 + 7x$ (iii) $2x^2y - 15xy^2 + 7y^2$

Ans:

S. No.	Expression	Terms	Coefficient of y^2
(i)	$8 - xy^2$	$-xy^2$	$-x$
(ii)	$5y^2 + 7x$	$5y^2$	5
(iii)	$2x^2y - 15xy^2 + 7y^2$	$-15xy^2$ $7y^2$	$-15x$ 7

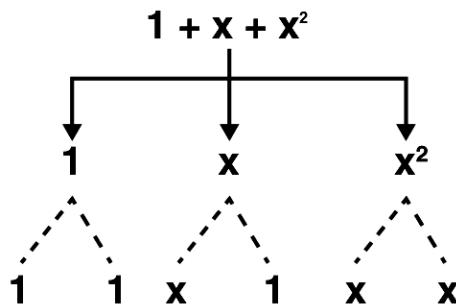
17. Identify the terms and their factors in the expressions: $1 + x + x^2$

Show the terms and factors by tree diagrams.

Ans: Expression: $1 + x + x^2$

Terms: 1, x, x^2

Factors: 1; x; x,x



SECTION – E

Questions 18 to 20 carry 4 marks each.

18. Simplify these expressions and find their values if $x = 3$, $a = -1$, $b = -2$.

(i) $3x - 5 - x + 9$ (ii) $2 - 8x + 4x + 4$ (iii) $3a + 5 - 8a + 1$ (iv) $10 - 3b - 4 - 5b$

Ans: (i) From the question, it is given that $x = 3$

We have, $= 3x - x - 5 + 9 = 2x + 4$

Then, substitute the value of x in the equation.

$= (2 \times 3) + 4 = 6 + 4 = 10$

(ii) From the question, it is given that $x = 3$

We have, $= 2 + 4 - 8x + 4x = 6 - 4x$

Then, substitute the value of x in the equation.

$= 6 - (4 \times 3) = 6 - 12 = -6$

(iii) From the question, it is given that $a = -1$

We have, $= 3a - 8a + 5 + 1 = -5a + 6$

Then, substitute the value of a in the equation.

$= -(5 \times (-1)) + 6 = -(-5) + 6 = 5 + 6 = 11$

(iv) From the question, it is given that $b = -2$

We have, $= 10 - 4 - 3b - 5b = 6 - 8b$

Then, substitute the value of b in the equation.

$= 6 - (8 \times (-2)) = 6 - (-16) = 6 + 16 = 22$

19. The radius of one circular field is 20 m and that of another is 48 m. Find the radius of the third circular field whose area is equal to the sum of the areas of two fields.

Ans: Let the area of the circle whose radius is 20 m be A_1 , and the area of the circle whose radius is 48 m be A_2 . Let A_3 be the area of a circle that is equal to the sum of the areas of the two fields,

with the radius of its field being r cm.

$$\therefore A_3 = A_1 + A_2$$

$$A_1 = \pi(20)^2 = \frac{22}{7} \times 20 \times 20 \text{m}^2 = (400\pi) \text{m}^2$$

$$A_2 = \pi(48)^2 = \frac{22}{7} \times 48 \times 48 \text{m}^2 = (2304\pi) \text{m}^2$$

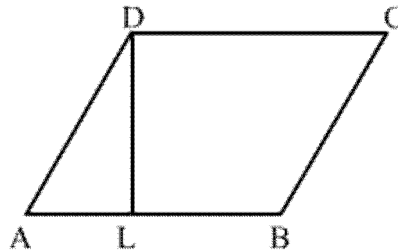
$$A_3 = A_1 + A_2 = (400\pi) + (2304\pi) = \pi(400 + 2304) \text{m}^2$$

$$\Rightarrow A_3 = \pi(r)^2 = \pi(400 + 2304) \text{m}^2$$

$$\Rightarrow (r)^2 = (400 + 2304) \text{m}^2$$

$$\Rightarrow r = \sqrt{2704} \text{m} = 52 \text{m}$$

20. In the below figure, $ABCD$ is a parallelogram, $DL \perp AB$. If $AB = 20$ cm, $AD = 13$ cm and area of the parallelogram is 100 cm^2 , find AL .



Ans: We have, $ABCD$ is a parallelogram with base $AB = 20$ cm and corresponding altitude DL . It is given that the area of the parallelogram $ABCD = 100 \text{ cm}^2$

Now,

Area of a parallelogram = Base x Height

$$100 \text{ cm}^2 = AB \times DL$$

$$100 \text{ cm}^2 = 20 \text{ cm} \times DL$$

$$\therefore DL = \frac{100 \text{ cm}^2}{20 \text{ cm}} = 5 \text{ cm}$$

Again by Pythagoras theorem, we have,

$$(AD)^2 = (AL)^2 + (DL)^2$$

$$\Rightarrow (13)^2 = (AL)^2 + (5)^2$$

$$\Rightarrow (AL)^2 = (13)^2 - (5)^2 = 169 - 25 = 144$$

$$\Rightarrow (AL)^2 = (12)^2 \Rightarrow AL = 12 \text{ cm}$$

Hence. length of AL is 12 cm.

