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PRACTICE PAPER 06 (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 2**0** questions divided into five Sections A, B, C, D and E.

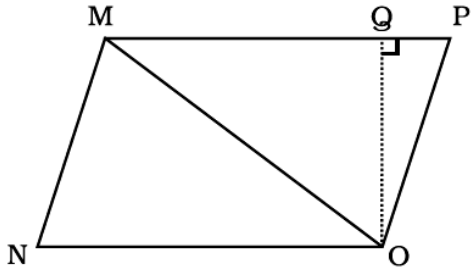
(iii). **Section A** comprises of **6 MCQs** of **1 mark** each. **Section B** comprises of **1 CCT question** of **4 marks** each which contains **4 MCQs**. **Section C** comprises of 3 questions of **2 marks** each. **Section D** comprises of 4 questions of **3 marks** each and **Section E** comprises of 3 questions of **4 marks** each.

SECTION – A

Questions 1 to 6 carry 1 mark each.

1. Ratio of area of ΔMNO 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 ΔMNO = ½ × base × height = ½ × NO × OQ

Area of parallelogram MNOP = base × corresponding height

= MP × OQ = NO × OQ … [from the figure MP = NO]

Then, ratio of parallelogram and triangle = (½ × NO × OQ)/(NO × 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

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

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

3. Area of a rectangle and the area of a circle are equal. If the dimensions of the rectangle are 14cm × 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

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

$\Rightarrow r^2 = (14 \times 11 \times 7)/22 \Rightarrow r^2 = 49 \Rightarrow r = \sqrt{49} \quad \Rightarrow r = 7$ 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 $-2ab^2 = 3 + (-2) = 3 - 2 = 1$

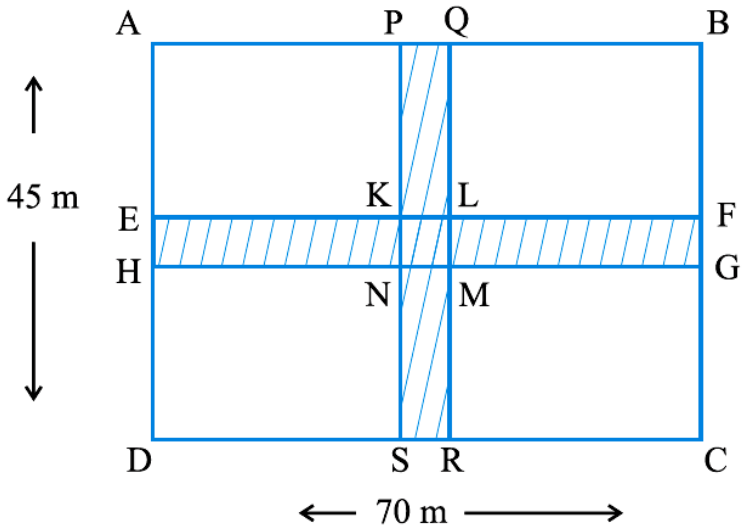
6. The sum of the values of the expression $2x^2 + 2x + 2$ when $x = -1$ and $x = 1$ is
(a) 6 (b) 8 (c) 4 (d) 2
Ans: (b) 8
Since, when $x = -1$, the value of the expression $2x^2 + 2x + 2 = 2(-1)^2 + 2(-1) + 2 = 2 - 2 + 2 = 2$
And, when $x = 1$, the value of the expression $2x^2 + 2x + 2 = 2(1)^2 + 2(1) + 2 = 2 + 2 + 2 = 6$
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 ÷ 2 = 4.2 cm.

∴ Area of the circle $= \pi r^2$

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

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

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

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

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

∴ Area of the circle $= \pi r^2$

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

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

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

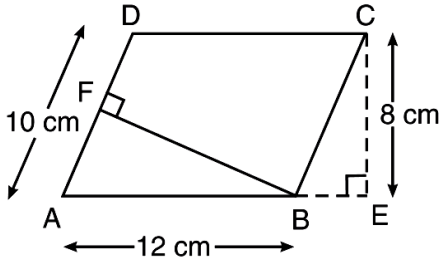
7a – 4b = 7 × 3 – 4 × 2 = 21 – 8 = 13.

SECTION – D

Questions 14 to 17 carry 3 marks each.

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

Ans:



Area of ||gm $ABCD$

= Base × Altitude = $AB \times CE$ ...(i)

= 12 cm × 8 cm = 96 cm^2

Also, area of ||gm $ABCD = AD \times BF = 10 \times BF$ ...(ii)

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

$\therefore \; BF = \frac{96}{10}$ cm = **9.6 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,

for n = –2, 5n – 2 = –12

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

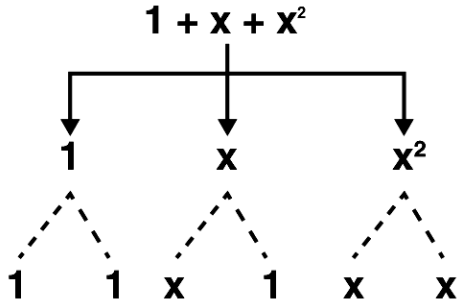
Combining, $5n^2 + 5n - 2 = 20 - 12 = 8$

(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.

$\therefore A_3 = A_1 + A_2$

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

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

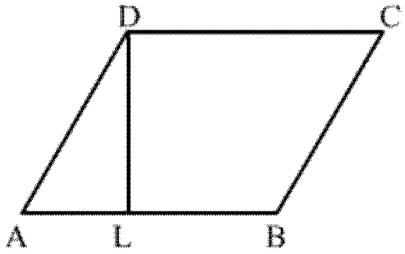
$A_3 = A_1 + A_2 = (400\pi) + (2304\pi) = \pi(400 + 2304)\text{m}^2$

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

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

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

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 cm^2
Now,
Area of a parallelogram = Base x Height

100 cm^2 = *AB* x *DL*

100 cm^2 = 20 cm x *DL*

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

Again by Pythagoras theorem, we have,

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

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

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

$\Rightarrow (AL)^2 = (12)^2 \quad \Rightarrow AL = 12$ cm

Hence. length of *AL* is 12 cm.