MATHEMATICS

WORKSHEET_010126 - CHAPTER 04,05 & 06

(ANSWERS)

SUBJECT: MATHEMATICS **MAX. MARKS : 40**

CLASS : IX **DURATION : 1½ hrs**

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 **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.

(iv). There is no overall choice.

(v). Use of Calculators is not permitted

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. If point (3, 0) lies on the graph of the equation $2x + 3y = k$, then the value of k is

(a) 6 (b) 3 (c) 2 (d) 5

Ans: On putting $x = 3$ and $y = 0$ in the equation $2x + 3y = k$, we have

$2 \times 3 + 3 \times 0 = k \Rightarrow 6 + 0 = k \Rightarrow k = 6$

Correct option is (a).

2. The graph of the linear equation $3x + 5y = 15$ cuts the x-axis at the point

(a) (5, 0) (b) (3, 0) (c) (0, 5) (d) (0, 3)

Ans: At x-axis, $y = 0$

On putting $y = 0$ in $3x + 5y = 15$, we have

$\Rightarrow 3x + 5 \times 0 = 15$

$\Rightarrow 3x = 15 \Rightarrow x = 5$

Correct option is (a).

3. The graph of the linear equation $y = 2x$ passes through the point

(a) (2, 1) (b) (2, – 1) (c) $\left(\frac{3}{2}, -3\right)$ (d) $\left(\frac{3}{2}, 3\right)$

Ans: (d) $\left(\frac{3}{2}, 3\right)$

4. If a straight line falling on two straight lines makes the interior angles on the same side of it, whose sum is 120°, then the two straight lines, if produced indefinitely, meet on the side on which the sum of angles is

(a) less than 120° (b) greater than 120° (c) equal to 120° (d) greater than 180°

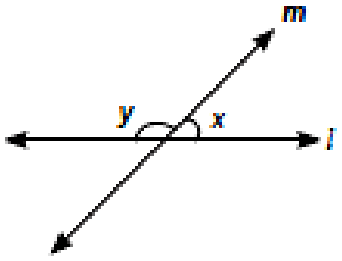
Ans: (c) equal to 120°

5. Euclid stated that all right angles are equal to each other in the form of

(a) an axiom (b) a definition (c) a postulate (d) a proof

Ans: (c) a postulate

6. In figure if $x : y = 1 : 4$, then values of x and y are respectively



(a) 36° and 144° (b) 18° and 72° (c) 144° and 36° (d) 72° and 18°

Ans: Given, x : y = 1 : 4

$\Rightarrow \frac{x}{y} = \frac{1}{4} = \frac{k}{4k} \Rightarrow$ x = k and y = 4k

From the figure, x + y = 180° (Linear pair axiom)

⇒ k + 4k = 180° ⇒ 5k = 180° ⇒ k = 36°

Hence, x = k= 36°

and y = 4k = 4 × 36° = 144°

Correct option is (a).

7. An angle is 20° more than three times the given angle. If the two angles are supplementary, then the angles are

(a) $\frac{70^0}{4}, \frac{290^0}{4}$ (b) 40°, 140° (c) 60°, 120° (d) 40°, 50°

Ans: Let an angle be x. Then, other angle = 3x + 20°

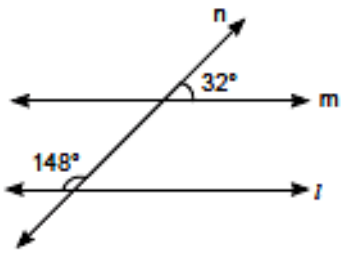
Since the two angles are supplementary, so

x + 3x + 20° = 180° ⇒ 4x = 180° – 20° = 160° ⇒ x = $\frac{160^0}{4}$ = 40°

So, one angle = 40°. Then, other angle = 3x + 20° = 3 × 40° + 20° = 120° + 20° = 140°

Correct option is (b).

8. In the given figure, the relation between line l and line m is



(a) l || m (b) l is not parallel to m

(c) lines l and m, intersect when produced (d) none of these

Ans: (a) l || m

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

9. **Assertion (A):** If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio 5 : 4, then the greater of the two angles is 100^0.

Reason (R): If a transversal intersects two parallel lines, then the sum of the interior angles on the same side of the transversal is 180^0.

Ans: (a) Both A and R are true and R is the correct explanation of A.

10. **Assertion (A):** If x = 2k – 1 and y = k is a solution of the equation 3x – 5y – 7 = 0, then the value of k is 10

Reason (R): A linear equation in two variables has infinitely many solutions.

Ans: (b) Both A and R are true but R is not the correct explanation of A.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Find the value of a and b, if the line $6bx + ay = 24$ passes through (2, 0) and (0, 2).

Ans: $6bx + ay = 24$ ...(i)

On putting $x = 2$ and $y = 0$ in (i), we have

$6b \times 2 + a \times 0 = 24 \Rightarrow 12b + 0 = 24 \Rightarrow 12b = 24$

$\Rightarrow b = \frac{24}{12} \Rightarrow b = 2$

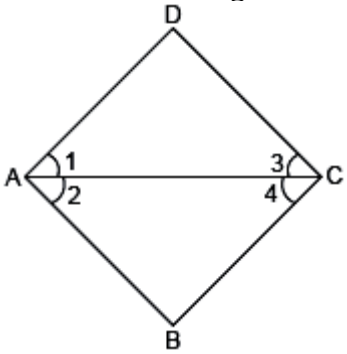
On putting $x = 0$ and $y = 2$ in (i), we have

$6b \times 0 + a \times 2 = 24 \Rightarrow 0 + 2a = 24 \Rightarrow 2a = 24$

$\Rightarrow a = \frac{24}{2} \Rightarrow a = 12$

Hence, value of a and b are 12 and 2 respectively.

12. In the given figure, if $\angle 2 = \angle 4$ and $\angle 4 = \angle 1$, then using Euclid's axiom prove that $\angle 1 = \angle 2$.

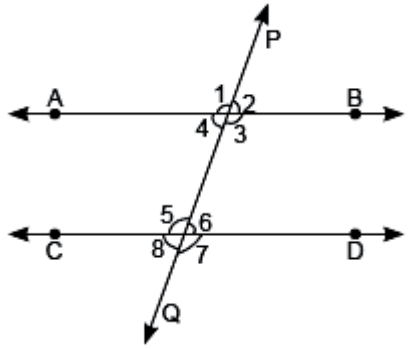


Ans: Given: $\angle 2 = \angle 4$ and $\angle 4 = \angle 1$, using Euclid's axiom, things which are equal to the same thing are equal to one another.

Hence, $\angle 2 = \angle 4 = \angle 1$

$\Rightarrow \angle 1 = \angle 2$ Hence proved.

13. In the given figure, AB || CD, $\angle 2 = 120° + x$ and $\angle 6 = 6x$. Find the measure of $\angle 2$ and $\angle 6$.



Ans: Given AB || CD,

$\Rightarrow \angle 2 = \angle 6$ (corresponding angles)

$\Rightarrow 120° + x = 6x$ ($\angle 2 = 120 + x$)

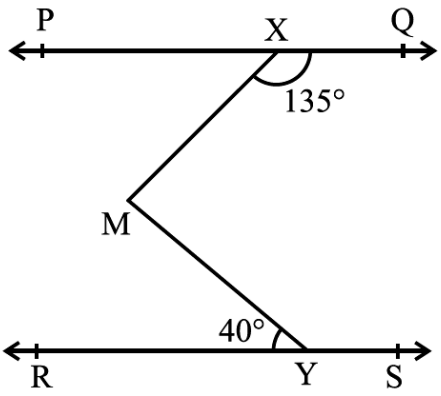
$\Rightarrow 120° = 6x - x = 5x$

$\Rightarrow x = \frac{120^0}{5} = 24°$

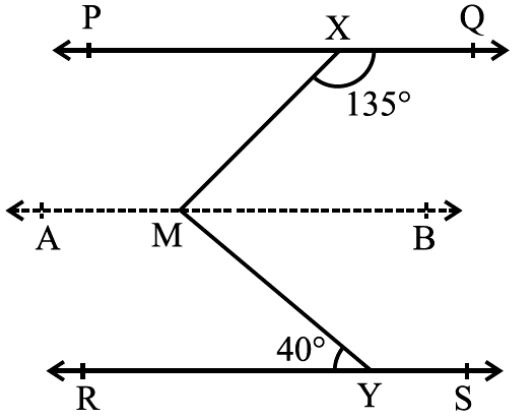
$\therefore \angle 2 = 120° + x = 120° + 24° = 144°$

and $\angle 6 = 6x = 6 \times 24° = 144°$

14. In the below figure, if PQ || RS, $\angle$ MXQ = 135° and $\angle$ MYR = 40°, find $\angle$ XMY.



Ans: Here, we draw a line AB parallel to line PQ, through point M. Now, AB || PQ and PQ || RS.



Therefore, AB || RS (Why?)
Now, ∠ QXM + ∠ XMB = 180°
(AB || PQ, Interior angles on the same side of the transversal XM)
But ∠ QXM = 135°
So, 135° + ∠ XMB = 180°
Therefore, ∠ XMB = 45° (1)
Now, ∠ BMY = ∠ MYR (AB || RS, Alternate angles)
Therefore, ∠ BMY = 40° (2)
Adding (1) and (2), you get
∠ XMB + ∠ BMY = 45° + 40°
That is, ∠ XMY = 85°

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Find the value of a, if the line $3y = ax + 7$, will pass through: (i) (3, 4), (ii) (1, 2), (iii) (2, –3)

Ans: $3y = ax + 7$

(i) Putting $x = 3$ and $y = 4$ in the given equation of line, we have

$3 \times 4 = a \times 3 + 7 \Rightarrow 12 = 3a + 7 \Rightarrow 3a = 12 - 7$

$\Rightarrow 3a = 5 \Rightarrow a = \frac{5}{3}$

(ii) Putting $x = 1$ and $y = 2$ in the given equation of line, we have

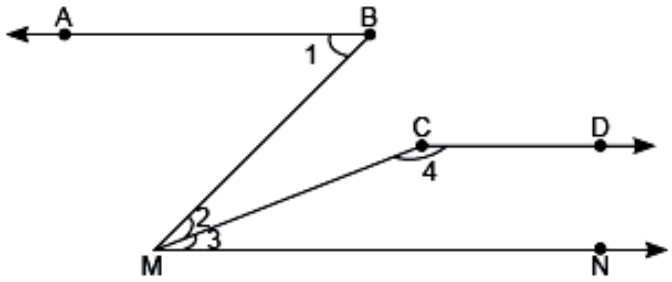
$3 \times 2 = a \times 1 + 7 \Rightarrow 6 = a + 7 \Rightarrow a = 6 - 7 \Rightarrow a = -1$

(iii) Putting $x = 2$ and $y = -3$ in the given equation, we have

$3 \times (-3) = a \times 2 + 7 \Rightarrow -9 = 2a + 7 \Rightarrow 2a = -9 - 7$

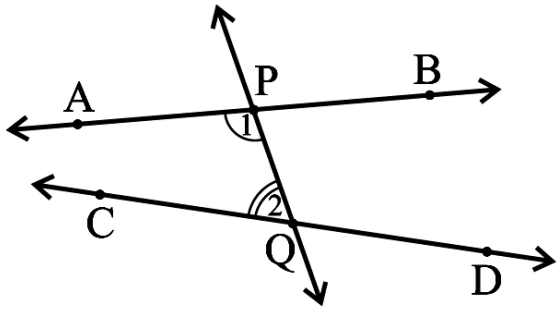
$\Rightarrow 2a = -16 \Rightarrow a = \frac{-16}{2} \Rightarrow a = -8$

16. In the given figure, $\angle 1 = 55°$, $\angle 2 = 20°$, $\angle 3 = 35°$ and $\angle 4 = 145°$. Prove that AB || CD.



Ans: We have,
$\angle BMN = \angle 2 + \angle 3 = 20° + 35° = 55° = \angle 1 = \angle ABM$.
But these are the alternate angles formed by transversal BM on AB and MN.
So, by converse of alternate interior angles theorem.
AB || MN ...(i)
Now, $\angle 3 + \angle 4 = 35° + 145° = 180°$
This, shows that sum of the co-interior angles is 180°.
Hence, CD || MN ...(ii)
From (i) and (ii), we have AB || CD. Hence proved.

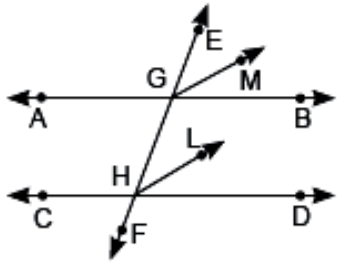
17. Write the statement of fifth Euclid's postulates and explain with the help of diagram.
Ans: Statement: If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angles.
For example, the line PQ in below figure falls on lines AB and CD such that the sum of the interior angles 1 and 2 is less than 180° on the left side of PQ. Therefore, the lines AB and CD will eventually intersect on the left side of PQ.



SECTION – D

Questions 18 carry 5 marks.

18. In the given figure, EF is the transversal to two parallel lines AB and CD. GM and HL are the bisectors of the corresponding angles EGB and EHD. Prove that GM || HL.



Ans: Given: AB || CD and EF is transversal that intersects AB and CD at G and H respectively
$\therefore$ $\angle EGB = \angle GHD$ ...(i) (Corresponding angles)
Now, GM is the angle bisector of $\angle EGB$
$\Rightarrow \angle EGM = \angle MGB = \frac{1}{2}\angle EGB$
$\Rightarrow \angle EGB = 2\angle EGM$ ...(ii)
Similarly, HL is the angle bisector of $\angle GHD$

$\Rightarrow$ $\angle GHL = \angle LHD = \frac{1}{2}\angle GHD$

$\Rightarrow$ $\angle GHD = 2\angle GHL$ ...(iii)

Substituting from (ii) and (iii) in (i), we get

$2\angle EGM = 2\angle GHL$

$\Rightarrow$ $\angle EGM = \angle GHL$

But these are equal corresponding angles formed by transversal EF with GM and HL.

Hence, GM || HL ...(Converse of corresponding angles axiom)

SECTION – E (Case Study Based Questions)

Questions 19 to 20 carry 4 marks each.

19. On his birthday, Manoj planned that this time he celebrates his birthday in a small orphanage centre. He bought apples to give to children and adults working there. Manoj donated 2 apples to each child and 3 apples to each adult working there along with Birthday cake. He distributed 60 total apples.

(a) How to represent the above situation in linear equations in two variables by taking the number of children as 'x' and the number of adults as 'y'? (1)

(b) If the number of children is 15, then find the number of adults? (1)

(c) If the number of adults is 12, then find the number of children? (1)

(d) Find the value of b, if $x = 5$, $y = 0$ is a solution of the equation $3x + 5y = b$ (1).

Ans: (a) Let the number of children be x and the number of adults be y then the linear equation in two variable for the given situation is $2x + 3y = 60$.

(b) $2x + 3y = 60 \Rightarrow 2(15) + 3y = 60$

$\Rightarrow 3y = 60 - 30 = 30$

$\Rightarrow y = 10$

(c) $2x + 3y = 60 \Rightarrow 2x + 3(12) = 60$

$\Rightarrow 2x = 60 - 36 = 24$

$\Rightarrow x = 12$

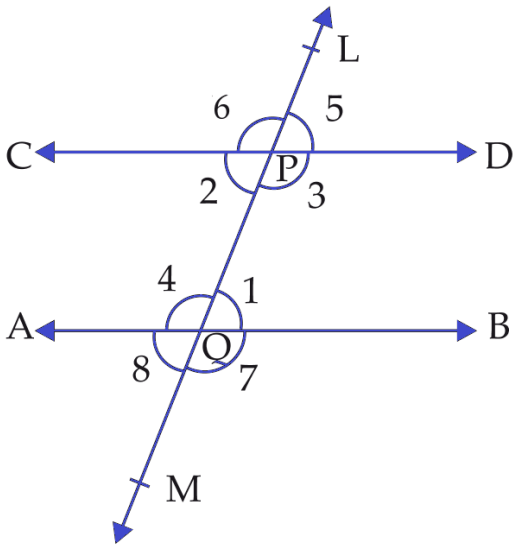
(d) On putting $x = 5$ and $y = 0$ in the equation $3x + 5y = b$, we have

$3 \times 5 + 5 \times 0 = b$

$\Rightarrow 15 + 0 = b$

$\Rightarrow b = 15$

20. Two lines are parallel to each other, if the distance between these 2 lines always remains constant throughout and they never meet. There are various examples of parallel lines that we see in our daily life like railway line, 2 steps of ladder, opposite sides of a table etc. A line which cuts a pair of parallel lines is called a transversal as shown in the figure.



Answer the following questions:

(a) If ∠5 = 65°. Then what is the ∠8? (1)

(b) If ∠6 = 2x and ∠1 = 70°. Then find the value of x. (1)

(c) If $\angle 6 : \angle 5 = 2 : 3$ then find the value of $\angle 7$. (2)

Ans: (a) Since $CD \parallel AB$ and LM is transversal,

$\angle 5$ and $\angle 8$ are the alternate exterior angles.

$\therefore \angle 5 = \angle 8$ or $\angle 8 = \angle 5 = 65°$

(b) Since $CD \parallel AB$ and LM is transversal,

$\therefore \angle 5 = 70°$ (Corresponding angles)

and $\angle 6 + \angle 5 = 180^0$ (Linear pair axiom)

$\Rightarrow 2x + 70° = 180°$

$\Rightarrow 2x = 110° \Rightarrow x = 55°$.

(c) Let $\angle 6 = 2k$ and $\angle 5 = 3k$

Now, $\angle 6 + \angle 5 = 180°$ (Linear pair axiom)

$\Rightarrow 2k + 3k = 180°$

$\Rightarrow 5k = 180° \Rightarrow k = 36°$

$\therefore \angle 6 = 2k = 2 \times 36° = 72°$

Now, $\angle 6$ and $\angle 7$ are the alternate exterior angles.

$\therefore \angle 6 = \angle 7$ or $\angle 7 = \angle 6 = 72°$