REG-EOSL-2425-ASM-SET 1-MATH
Suggested solutions

Multiple Choice Questions

1. D	2. C	3. C	4. A	5. D
6. B	7. A	8. D	9. C	10. D
11. C	12. A	13. C	14. D	15. B
16. B	17. D	18. C	19. A	20. A
21. C	22. B	23. A	24. A	25. D
26. B	27. A	28. A	29. D	30. D

1. D

Let the coordinates of P be $(h,\ k)$.
Since P lies on $2x - y - 1 = 0$, we have $2h - k - 1 = 0$.

$$AP = PB$$
$$\sqrt{(h+5)^2 + (k+1)^2} = \sqrt{(h-3)^2 + (k-3)^2}$$
$$(h+5)^2 + [(2h-1)+1]^2 = (h-3)^2 + [(2h-1)-3]^2$$
$$5h^2 + 10h + 25 = 5h^2 - 22h + 25$$
$$h = 0$$

The coordinates of P are $(0,\ -1)$.

2. C

$(4) + 2y + 4 = 0$ and $x + 2(-1) + 4 = 0$

$y = -4$ $x = -2$

The coordinates of P and R are $(-2,\ -1)$ and $(4,\ -4)$ respectively.
Required distance $= \sqrt{(4+2)^2 + (-1+4)^2}$
$= \sqrt{45}$

3. C

The coordinates of A and B are $(-6,\ 0)$ and $(0,\ 2)$ respectively.

Let the coordinates of P be $(h,\ k)$.

Since P lies on L_2, we have $k = 2h + 2$.

$$PA = PB$$
$$\sqrt{(h+6)^2 + k^2} = \sqrt{h^2 + (k-2)^2}$$
$$h^2 + k^2 + 12h + 36 = h^2 + k^2 - 4k + 4$$
$$12h + 4k = -32$$

Solving, we have $h = -2$ and $k = -2$.

The coordinates of P are $(-2,\ -2)$.

4. A

A. ✗. $2(-3) + 3(2) + 12 = 12 \neq 0$

B. ✓. $2(0) + 3(-4) + 12 = 0$

C. ✓. $2(3) + 3(-6) + 12 = 0$

D. ✓. $2(6) + 3(-8) + 12 = 0$

5. D

$5 = m(2) + 3$

$m = 1$

6. B

Let the coordinates of P be $(p,\ p+1)$ such that P lies on $y = x + 1$.

$$AP = PB$$
$$\sqrt{(p-3)^2 + (p+1-9)^2} = \sqrt{(p-7)^2 + (p+1-1)^2}$$
$$2p^2 - 22p + 73 = 2p^2 - 14p + 49$$
$$p = 3$$

The coordinates of P are $(3,\ 4)$.

7. A

Let the coordinates of P be $(p,\ p)$ such that P lies on the straight line $x = y$.

$$AP = PB$$
$$\sqrt{(p-2)^2 + (p-5)^2} = \sqrt{(p-6)^2 + (p+3)^2}$$
$$2p^2 - 14p + 29 = 2p^2 - 6p + 45$$
$$p = -2$$

The coordinates of P are $(-2,\ -2)$.

8. D

Let $A\ (a,\ 1)$ and $B\ (2,\ b)$. Substitute them into $y = 2x + 3$, we have $a = -1$ and $b = 7$.
Distance between A and $B = \sqrt{(2+1)^2 + (7-1)^2} = \sqrt{45} = 3\sqrt{5}$

9. C

Slope of $L_1 = \dfrac{1+2}{0+3} = 1$
Slope of $L_2 = \dfrac{-1}{1} = -1$
Required equation is

$$y + 2 = -1(x + 3)$$
$$x + y + 5 = 0$$

10. D

Slope $= \dfrac{7-3}{0+2} = 2$
Required equation is

$$y - 7 = 2(x - 0)$$
$$y = 2x + 7$$

11. C

Slope $= \dfrac{4+7}{-6+2} = -\dfrac{11}{4}$
Required equation is

$$y - 4 = -\frac{11}{4}(x + 6)$$
$$11x + 4y + 50 = 0$$

12. A

Slope of $L_1 = \dfrac{4-0}{-1-0} = -4$
Slope of $L_2 = \dfrac{1}{4}$
Required equation is

$$y - 4 = \frac{1}{4}(x + 1)$$
$$x - 4y + 17 = 0$$

13. C

The coordinates of mid-point of BD are $(4,\ 6)$.
Slope of $BD = \dfrac{9-3}{5-3} = 3$
Required equation is

$$y - 6 = -\frac{1}{3}(x - 4)$$
$$x + 3y - 22 = 0$$

14. D

The coordinates of the mid-point of AB are $\left(-1,\ \frac{11}{2}\right)$.

Slope of $AB = \frac{8-3}{-4-2} = -\frac{5}{6}$

Required equation is

$$y - \frac{11}{2} = \frac{6}{5}(x+1)$$

$$12x - 10y + 67 = 0$$

15. B

Since $OA = AB$, we have $\angle AOB = \angle ABO$ and slope of OA is $-m$.

Required equation is

$$y = -mx$$

$$mx + y = 0$$

16. B

Slope $= \frac{2+2}{-1-3} = -1$

Required equation is

$$y - 2 = -1(x+1)$$

$$x + y - 1 = 0$$

17. D

Slope $= \frac{4-0}{0+3} = \frac{4}{3}$

Required equation is

$$y - 4 = \frac{4}{3}(x-0)$$

$$4x - 3y + 12 = 0$$

18. C

The coordinates of the mid-point of AB are $\left(\frac{3}{2},\ \frac{9}{2}\right)$.

Slope of $AB = \frac{3-6}{4+1} = -\frac{3}{5}$

Required equation is

$$y - \frac{9}{2} = \frac{5}{3}\left(x - \frac{3}{2}\right)$$

$$5x - 3y + 6 = 0$$

19. A

mid-point of BC is at $(7,\ 5)$. Required straight line passes through A and $(7,\ 5)$.

Slope of the line $= \dfrac{5-3}{7-3} = \dfrac{1}{2}$.

Only the line in option A has slope $\dfrac{1}{2}$.

20. A

Slope of $L_2 = \dfrac{4}{2} = 2$

Slope of $L_1 = -\dfrac{1}{2}$

Required equations is

$$y - 4 = -\frac{1}{2}(x - 2)$$

$$x + 2y = 10$$

21. C

Slope of $L_1 = -\tan 30^\circ = -\dfrac{1}{\sqrt{3}}$

Slope of $L_2 = \sqrt{3}$

Required equation is

$$y - 0 = \sqrt{3}(x + 1)$$

$$\sqrt{3}x - y + \sqrt{3} = 0$$

22. B

$\angle OAB = 45^\circ$

$\tan 45^\circ = \dfrac{OB}{OA}$

$OB = OA$

$OA^2 + OB^2 = AB^2$

$OA = OB = 8$

Slope $= -\tan 45^\circ = -1$

Required equation is

$$y - 8 = -1(x - 0)$$

$$x + y - 8 = 0$$

23. A

Slope $= \tan 30^\circ = \dfrac{1}{\sqrt{3}}$

Required equation is

$$y + 3 = \frac{1}{\sqrt{3}}(x - 0)$$

$$x - \sqrt{3}y - 3\sqrt{3} = 0$$

24. A

Slope of $L_2 = \tan(180^\circ - 90^\circ - 60^\circ) = \dfrac{1}{\sqrt{3}}$

Required equation is

$$y - 0 = \frac{1}{\sqrt{3}}(x - 0)$$

$$x - \sqrt{3}y = 0$$

25. D

Slope $= -\tan 180^\circ - 90^\circ - 60^\circ = -\dfrac{1}{\sqrt{3}}$

Required equation is

$$y - 0 = -\frac{1}{\sqrt{3}}(x - 3)$$

$$x + \sqrt{3}y - 3 = 0$$

26. B

Slope $= \tan 45^\circ = 1$

Required equation is

$$y - 0 = 1(x - 3)$$

$$x - y - 3 = 0$$

27. A

Slope of the line $= \tan(180^\circ - 45^\circ) = -1$

Required equation is

$$y - 0 = -(x + 2)$$

$$x + y + 2 = 0$$

28. A

Slope of $L = \tan(180^\circ - 45^\circ) = -1$

Required equation is

$$y - 0 = -(x - 4)$$

$$x + y = 4$$

29. D

Slope of $L_1 = \tan 30^\circ = \dfrac{1}{\sqrt{3}}$

Slope of $L_2 = -\sqrt{3}$

Equation of L_2 is

$$y = -\sqrt{3}x$$

$$\sqrt{3}x + y = 0$$

30. D

Slope = $a < 0$ and y-intercept = $b > 0$.

Only option D satisfies this.

Conventional Questions

31. (a) Slope of $AB = \dfrac{-1-3}{3+3} = -\dfrac{2}{3}$.
The equation of AB is

$$y - 3 = -\frac{2}{3}(x+3) \quad \text{1M}$$

$$y = -\frac{2}{3}x + 1 \quad \text{1A}$$

(b) Put $x = 7$ into $y = -\dfrac{2}{3}x + 1$,

$$y = -\frac{2}{3}(7) + 1 \quad \text{1M}$$

$$= -\frac{11}{3} \neq -4 \quad \text{1M}$$

Thus, A, B and C are not collinear. 1A

32. (a) The equation of L is

$$y + 3 = \frac{5}{4}(x+2) \quad \text{1M}$$

$$5x - 4y - 2 = 0 \quad \text{1A}$$

(b) Sub $(6,\ 7)$ into $5x - 4y - 2 = 0$, we have

$$\text{L.H.S.} = 5(6) - 4(7) - 2 \quad \text{1M}$$

$$= 0 = \text{R.H.S.}$$

Thus, L passes through the point $(6,\ 7)$. 1A

33. (a) $\dfrac{3k+1}{k+12} = \dfrac{3k-2k}{k+k}$ 1M

$$6k + 2 = k + 12$$

$$k = 2 \quad \text{1A}$$

(b) (i) The coordinates of A are $(2,\ 6)$. The coordinates of A' are $(2,\ -6)$. 1A

Slope of $AB = \dfrac{6+1}{2+12} = \dfrac{1}{2}$. Slope of $L = -1 \div \dfrac{1}{2} = -2$. 1A

The equation of L is

$$y + 6 = -2(x-2) \quad \text{1M}$$

$$y = -2x - 2 \quad \text{1A}$$

(ii) The coordinates of C are $(-2,\ 4)$.

Put $x = -2$ into $y = -2x - 2$, $y = -2(-2) - 2 = 2 \neq 4$. 1M

Thus, C does not lie on L and AC is not perpendicular to $A'C$.

$\angle ACA'$ is not a right angle. 1A

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