REG-CP2A-2425-ASM-SET 1-MATH
Suggested solutions

Multiple Choice Questions

1. B	2. B	3. B	4. C	5. B
6. D	7. A	8. A	9. B	10. D
11. D	12. C	13. D	14. A	15. D
16. B	17. A	18. D	19. A	20. C
21. C	22. A	23. C	24. A	25. D
26. B	27. A	28. A	29. C	30. A
31. D	32. B	33. C	34. D	35. C
36. B	37. B	38. D	39. A	40. C
41. A	42. A	43. D	44. C	45. B
46. C	47. C	48. D		

1. $\boxed{\text{B}}$

$$(3y^2)^{-5} = 3^{-5}y^{-10} = \frac{1}{243y^{10}}$$

2. $\boxed{\text{B}}$

$$\frac{27^{n+2}}{3^{3n+4}} = \frac{3^{3n+6}}{3^{3n+4}} = 3^2 = 9$$

3. $\boxed{\text{B}}$

$$(27 \cdot 9^{n+1})^3 = (3^3 \cdot 3^{2n+2})^3$$
$$= (3^{2n+5})^3$$
$$= 3^{6n+15}$$

4. $\boxed{\text{C}}$

$$\frac{(3x^5)^6}{81x^{12}} = 9x^{30-12} = 9x^{18}$$

5. $\boxed{\text{B}}$

$$(2n^3)^{-5} = 2^{-5}n^{-15}$$
$$= \frac{1}{32n^{15}}$$

6. $\boxed{\text{D}}$

$$\frac{27^{4n-2}}{9^{6n-4}} = \frac{3^{12n-6}}{3^{12n-8}}$$
$$= 3^{(12n-6)-(12n-8)}$$
$$= 3^2$$

7. $\boxed{\text{A}}$

$$9x^2 - 12xy + 4y^2 - 3x + 2y = (3x - 2y)^2 - (3x - 2y)$$
$$= (3x - 2y)(3x - 2y - 1)$$

8. $\boxed{\text{A}}$

Put $x = -1$.
$$\frac{1}{2} = -n(-5) - 7$$
$$n = \frac{3}{2}$$
Put $x = 4$.
$$8m(5) + 8 = 28$$
$$m = \frac{1}{2}$$

9. $\boxed{\text{B}}$

Compare the x term and the constant term of both sides.
$$\begin{cases} 2p = 4p + q \\ p + 21 = -4q \end{cases}$$
Solving, we have $p = 3$ and $q = -6$.

10. $\boxed{\text{D}}$

Compare the coefficients of x^2.
$$A = 2$$

Compare the coefficients of x.
$$-2A + B = -5$$
$$B = -1$$

11. $\boxed{\text{D}}$

$$p - q + p^2 - 2pq + q^2$$
$$= (p - q) + (p - q)^2$$
$$= (p - q)(p - q + 1)$$

12. $\boxed{C}$

Check the coefficient of each term.

	$-3x$	$-4y^2$	$-6y$
A.	✗		
B.	✗		
C.	✓	✓	✓
D.	✓	✓	✗

13. $\boxed{D}$

Put $x = -2$.

$$a(-2 + 3) + b(-6 + 1) = 0$$
$$a = 5b$$
$$a : b = 5 : 1$$

14. $\boxed{A}$

When $x = -2$,

$$p(-2)(-4) + 2(-2)^2 = 0 - 6(-2)$$
$$p = \frac{1}{2}$$

15. $\boxed{D}$

$$4p^4 - 64 = 4(p^2 + 4)(p^2 - 4)$$
$$= 4(p^2 + 4)(p + 2)(p - 2)$$

16. $\boxed{B}$

Put $x = -4$,

$$4^2 + 0 = 0 + q$$
$$q = 16$$

Compare the x term of both sides, $p = 4 - 6 = -2$.

17. $\boxed{A}$

Check the coefficient of the specific term in each expansion.

	$5v$	$-5u$	$-6h$
A.	✓	✓	
B.	✗		
C.	✗		
D.	✓	✗	

18. $\boxed{\text{D}}$

Check the coefficient of the specific term in the expansion.

	β	$-\beta^2$	$-\alpha$
A.	✓	✓	✗
B.	✗		
C.	✗		
D.	✓	✓	✓

19. $\boxed{\text{A}}$

$x - \dfrac{x-1}{2} > 5$ or $1 < x - 11$

$\qquad\quad x > 9 \qquad\qquad x > 12$

Thus, $x > 9$.

20. $\boxed{\text{C}}$

$3x - \dfrac{1-x}{2} + a > 0$ $\qquad$ and $\quad 2x - 6 > 0$

$\qquad\qquad \dfrac{7x}{2} > \dfrac{1}{2} - a \qquad\qquad\qquad x > 3$

$\qquad\qquad\quad x > \dfrac{1}{7} - \dfrac{2a}{7}$

Thus, $\dfrac{1}{7} - \dfrac{2a}{7} = -3$. So, $a = 11$.

21. $\boxed{\text{C}}$

$\dfrac{3x+1}{2} < x - 1$ and $4x - 5 > 7x + 1$

$\qquad\quad x < -3 \qquad\qquad\quad x < -2$

Thus, $x < -3$.

22. $\boxed{\text{A}}$

$-5x > 21 - 2x$ and $6x - 18 < 0$

$\quad x < -7 \qquad\qquad\qquad x < 3$

Thus, $x < -7$.

23. $\boxed{\text{C}}$

$2(x+1) + 5 \le 3$ $\qquad$ or $\quad \dfrac{4x-1}{11} < 1$

$\qquad\quad x \le -2 \qquad\qquad\qquad x < 3$

Thus, we have $x < 3$.

The greatest integer is 2.

24. $\boxed{\text{A}}$

$11 - 2x < 13 \quad$ and $\quad \dfrac{x}{2} + 1 > \dfrac{x}{4}$

$\qquad x > -1 \qquad\qquad\qquad \dfrac{x}{4} > -1$

$\qquad\qquad\qquad\qquad\qquad\qquad x > -4$

Therefore, $x > -4$.

25. $\boxed{\text{D}}$

$\text{Interest} = 4000\left(1 + \dfrac{4\%}{4}\right)^{5 \times 4} - 4000$

$\qquad\qquad \approx \$881$

26. $\boxed{\text{B}}$

$x\left(1 + \dfrac{6\%}{12}\right)^{4 \times 12} - x = 12\,000$

$\qquad x(1.005^{48} - 1) = 12\,000$

$\qquad\qquad\qquad x \approx 44\,364$

27. $\boxed{\text{A}}$

Let the cost be $\$C$.

$\text{Selling price} = C(1 + 25\%) = \dfrac{C}{1 - x\%}$

$\qquad\qquad\qquad 1 - x\% = \dfrac{1}{1.25}$

$\qquad\qquad\qquad\qquad x\% = 0.2$

$\qquad\qquad\qquad\qquad\ x = 20$

28. $\boxed{\text{A}}$

$(60\%)(45\%) + (1 - 60\%)(x\%) = 33\%$

$\qquad\qquad\qquad\qquad\qquad x = 15$

29. $\boxed{\text{C}}$

$(44\%)(55\%) + (1 - 44\%)(x\%) = 66\%$

$\qquad\qquad\qquad\qquad\qquad x \approx 74.6$

30. $\boxed{\text{A}}$

Let $\$x$ be the marked price of the watch.

$\qquad x - x(1 - 25\%) = 162.5$

$\qquad\qquad\qquad\qquad x = 650$

31. D

Assign reasonable values to the intercepts.

Use the points $(-2, 0)$ and $(0, 2)$,
we have $a = -\dfrac{1}{2}$ and $b = \dfrac{1}{2}$.
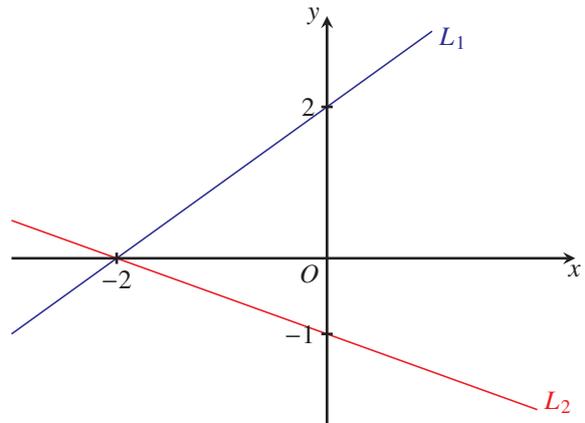
Use the points $(-2, 0)$ and $(0, -1)$,
we have $c = \dfrac{1}{2}$ and $d = 1$.

   I. ✓.

  II. ✓.

 III. ✓.

Consider the slope, x-intercept and y-intercept of L_1 and L_2.

Line	Slope	x-intercept	y-intercept
L_1	$-\dfrac{a}{b}$	$\dfrac{1}{a}$	$\dfrac{1}{b}$
L_2	$-\dfrac{c}{d}$	$-\dfrac{1}{c}$	$-\dfrac{1}{d}$

  I. ✓. y-intercept of L_1 is positive.

$$\frac{1}{b} > 0$$
$$b > 0$$

 II. ✓. y-intercept of L_2 is negative.

$$-\frac{1}{d} < 0$$
$$d < 0$$

III. ✓. L_1 and L_2 have equal x-intercepts.

$$\frac{1}{a} = -\frac{1}{c}$$
$$c = -a$$
$$a + c = 0$$

32. B

Coordinates of A and B are $(3, 0)$ and $(0, 6)$. mid-point of AB is at $\left(\dfrac{3}{2}, 3\right)$.

Slope of $L_2 = \dfrac{3}{\left(\dfrac{3}{2}\right)} = 2$

Equation of L_2 is $y = 2x$, i.e., $2x - y = 0$.

33. $\boxed{\text{C}}$

$(50,\ 120°) \quad \longrightarrow \quad (50,\ 210°) \quad = \quad \left(-25\sqrt{3},\ -25\right)$

34. $\boxed{\text{D}}$
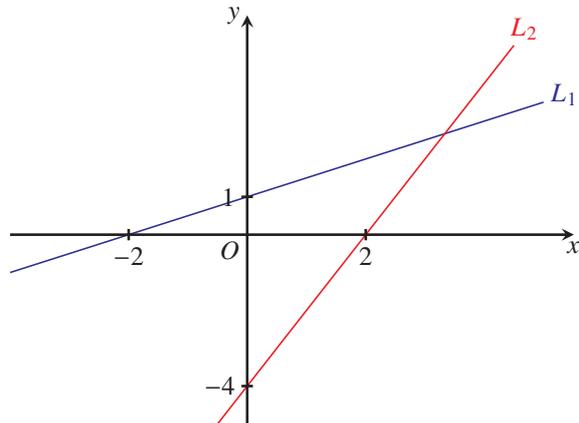
Assign suitable values to the intercepts.

Using the points $(-2,\ 0)$ and $(0,\ 1)$,
we have $a = -2$ and $b = 2$.
Using the points $(2,\ 0)$ and $(0,\ -4)$,
we have $c = -\dfrac{1}{2}$ and $d = -2$.
The result follows.

35. $\boxed{\text{C}}$

$\left(\sqrt{3},\ -1\right) \quad \longrightarrow \quad \left(\sqrt{3},\ 1\right) \quad = \quad (2,\ 210°)$

36. $\boxed{\text{B}}$

Take $b = c = -1$ for simplicity.

$$x - y - 1 = 0$$
$$y = x - 1$$

Slope $= 1 > 0$ and y-intercept $= -1 < 0$.
The answer is B.

37. $\boxed{\text{B}}$

$\left(-1,\ \sqrt{3}\right) \quad \longrightarrow \quad \left(-1,\ -\sqrt{3}\right) \quad = \quad (2,\ 240°)$

38. $\boxed{\text{D}}$

$\left(-3,\ -3\sqrt{3}\right) \quad \longrightarrow \quad \left(3\sqrt{3},\ -3\right) \quad = \quad (6,\ 330°)$

39. $\boxed{\text{A}}$

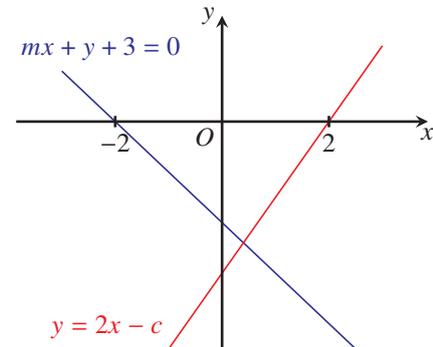$\left(-1,\ -\sqrt{3}\right) \longrightarrow \left(-1,\ \sqrt{3}\right) \quad = \quad (2,\ 120°)$

40. **C**

Assign reasonable values to the intercepts. Note that you need only one intercept to solve the unknown in each equation.

$(-2, 0) \rightarrow m = 1.5$
$(2, 0) \rightarrow c = 4$
The result follows.

41. **A**

$\left(-1, \sqrt{3}\right) \longrightarrow \left(-\sqrt{3}, -1\right) = (2, 210°)$

42. **A**

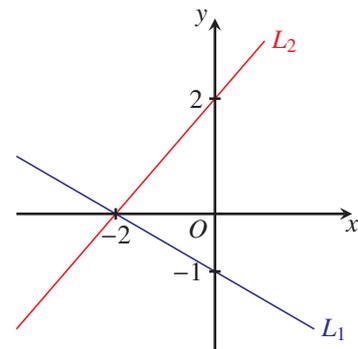Assign reasonable values to the intercepts.

L_1:
$(-2, 0) \rightarrow b = 2$
$(0, -1) \rightarrow a = 2$
L_2:
$(-2, 0) \rightarrow q = 2$
$(0, 2) \rightarrow p = -1$
The result follows.

43. **D**

Maximum absolute error $= \dfrac{0.01}{2} = 0.005$
We have $6.24 - 0.005 \le x < 6.24 + 0.005$.
Thus, $6.235 \le x < 6.245$.

44. **C**

No steps required.

45. **B**

Note that 73.8 and 73.89 are possible values of y.
Only option B satisfies these two possible values.

46. $\boxed{\text{C}}$

$$n < \frac{3.5 + 0.25}{0.080 - 0.0005}$$

$n < 47.2$

Greatest value of n is 47.

47. $\boxed{\text{C}}$

$$n < \frac{2.5 \times 1000}{39.5}$$

$n < 63.3$

The greatest possible value of n is 63.

48. $\boxed{\text{D}}$

$$\frac{1}{\pi^4} \approx 0.010\,265\,982$$

     A. ✗. It should be 0.0103 instead.

     B. ✗. It should be 0.010 27 instead.

     C. ✗. It should be 0.010 27 instead.

     D. ✓.

END OF PAPER