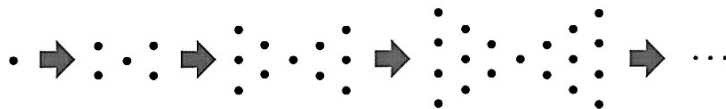


Section A: Multiple Choice Questions (20 marks)

Please write your answers on the answer sheets provided.

1. The following figures are formed by dots with a pattern.



Find the number of dots in the next figure.

- A. 27
B. 28
C. 29
D. 30

2. A bakery sold 480 tarts yesterday. If the number of tarts sold today is 576, find the percentage increase in the number of tarts sold.

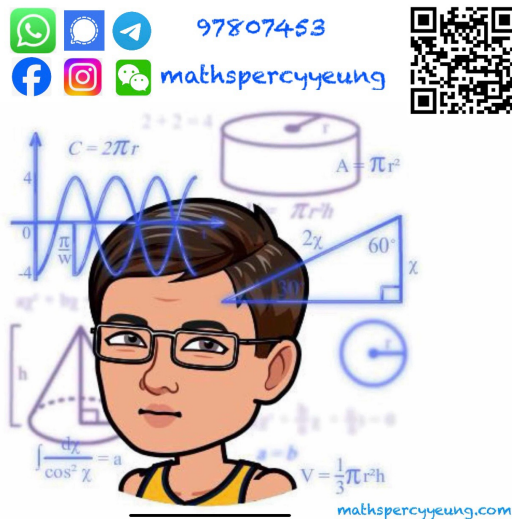
- A. $16\frac{2}{3}\%$
B. 20%
C. 80%
D. 120%

3. When rounding off 301.52 to the nearest integer, how many significant figures are there?

- A. 1
B. 3
C. 4
D. 5

4. $a^{6n}b^{3n} \times \left(\frac{a^2}{b}\right)^{3n} =$

- A. a^{12n} .
B. b^{6n} .
C. a^n6^{7n} .
D. $a^{12n}b^n$.



5. $(2x^5 - 8x^6 + 2x^2 - 5x - 2) - (4x^3 - 5x^5 + 2x^2 - x + 9) =$

- A. $-8x^6 + 7x^5 + 4x^3 - 4x$.
B. $-8x^6 + 7x^5 - 4x^3 - 4x$.
C. $-8x^6 + 7x^5 - 4x^3 - 4x - 11$.
D. $-8x^6 - 7x^5 - 4x^3 - 4x - 7$.

6. $(a + b)(a + b) - (a - b)(a - b) =$
A. 0.
B. $2a^2 + 2b^2$.
C. $-2b^2$.
D. $4ab$.
7. The constant term of the product of $2x^3 + 6x^2 - 2 + 4x$ and $5x^3 - 7 + 4x$ is
A. 10.
B. 14.
C. -14 .
D. 16.
8. Factorize $x(a - b) - y(b - a)$.
A. $(x - y)(a - b)$
B. $(x + y)(a + b)$
C. $(x + y)(a - b)$
D. $(x - y)(a + b)$
9. Factorize $x^2 - x - y + 2xy + y^2$.
A. $(x + y)(x + y + 1)$
B. $(x + y)(x + y - 1)$
C. $(x - y)(x + y - 1)$
D. $-(x - y)(x + y - 1)$
10. Which of the following is NOT an identity?
A. $(a + b)(a + b) = a^2 + 2ab + b^2$
B. $(5a + 1) - (3a - 1) = 2(a + 1)$
C. $3(a + 1) = 3a + 1$
D. $(a + b)(a - b) = a^2 - b^2$
11. If $12x^2 - ax + 5 \equiv (3x + 1)(1 - bx) + 4$, where a and b are constants, find a and b .
A. $a = 7, b = 4$
B. $a = -7, b = 4$
C. $a = 7, b = -7$
D. $a = -7, b = -4$

12. $(x + \frac{1}{x})^2 (x - \frac{1}{x})^2 =$

A. $x^4 + 2 - \frac{1}{x^4}.$

B. $x^4 - 2 - \frac{1}{x^4}.$

C. $x^4 + 2 + \frac{1}{x^4}.$

D. $x^4 - 2 + \frac{1}{x^4}.$

13. If $a + \frac{1}{a} = 5$, then $a^2 + \frac{1}{a^2} =$

A. 27.

B. 25.

C. 23.

D. 21.

14. Simplify $\frac{3x}{4-x} + \frac{1-3x}{5-x}.$

A. $\frac{2x+4}{(4-x)(5-x)}$

B. $\frac{1}{9-2x}$

C. $\frac{3x-1}{(4-x)(5-x)}$

D. $\frac{4x+4}{(4-x)(5-x)}$

15. $2(x+1)^2 \times \frac{6y+9}{2y^2+3y} \div \frac{x+1}{y} =$

A. $2(x+1).$

B. $6(x+1).$

C. $\frac{2(x+1)}{y^2}.$

D. $\frac{6(x+1)}{y^2}.$

16. $1 - x^2 - y^2 + x^2y^2$ can be factorized as
- A. $(1 + x^2)(1 + y^2)$.
B. $(1 + x)(1 - x)(1 + y^2)$.
C. $(1 + x^2)(1 - y)(1 + y)$.
D. $(1 + y)(1 + x)(1 - y)(1 - x)$.
17. Which of the following is NOT a factor of $(p^2 - 1)^2 - 11(p^2 - 1) + 24$?
- A. $p + 1$
B. $p + 2$
C. $p + 3$
D. $p^2 - 4$
18. If $V = \frac{1}{6}ab + h$, find a if $V = 7$, $b = 3$ and $h = 5$.
- A. 4
B. 3
C. 2
D. 1
19. Change the subject of the formula $M = (h + k)a + (h - k)b$ to k .
- A. $k = \frac{M + h(a + b)}{a - b}$
B. $k = \frac{M + h(a - b)}{a + b}$
C. $k = \frac{M - h(a - b)}{a + b}$
D. $k = \frac{M - h(a + b)}{a - b}$
20. Find the value of y in the following simultaneous linear equations.
- $$\begin{cases} \frac{x}{2} - \frac{y}{3} = 1 \\ \frac{x}{2} + \frac{y}{6} = -2 \end{cases}$$
- A. $y = -6$
B. $y = -2$
C. $y = 6$
D. $y = 7.5$

End of Section A

Section B: Short Questions (20 marks)

1. Simplify $\frac{(-3b^4c^5)^3}{-(b^6c^7)^2}$. (2 marks)

2. Factorize the following by using cross-method.

- (a) $p^2 + 14p - 72$,
(b) $-15c^2 + 19cd + 56d^2$ (5 marks)

3. Simplify $\frac{a}{a-b} - \frac{2b}{b-a} + \frac{4a}{5b-5a}$.

(3 marks)

[illegible]

4. Consider the formula $y = \frac{1}{7}(1 - 3x)$.

- (a) Make x the subject of the above formula.
- (b) If the value of y is increased by 3, find the change in the value of x . (5 marks)

[illegible]

- (5 marks)

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P.9

F. 2 _____ **Name:** _____ () **Score:** _____ /30

Section C: Conventional Questions (30 marks)

Show all your working in the spaces provided.

1. If $(x+P)(x+3)+Q(2x-5)\equiv(x+1)^2+(2P+1)x+2Q+1$, where P and Q are constants, find P and Q .

(4 marks)

[illegible]

2. Simplify the following expressions:

(a) $\frac{2a^4}{6a^2 \times 4a^6}$

(b) $\frac{4^{6a}}{2^{4a} \times 6^{2a}}$

(5 marks)

[illegible]

3. It is given the formula $\frac{1}{p} + \frac{1}{q} = 1$.

(a) Make p the subject of the formula.

(b) Hence, show that $1 + \frac{2}{q-1} + \frac{1}{(q-1)^2} = p^2$.

(6 marks)

[illegible]

4. (a) Factorize $6x^2 + 5x - 4$.

(b) Hence, factorize the following expressions completely:

(i) $6ax + 8a - 6x^2 - 5x + 4$

(ii) $6x^4 + 5x^3 - 10x^2 - 5x + 4$

(7 marks)

[illegible]

5. Consider the simultaneous equations (E) $\begin{cases} x + ay = b \\ x + by = a \end{cases}$, where a, b are constants.

(a) It is given that $a \neq b$.

(i) By solving (E),

(1) find the value of y .

(2) express the value of x in terms of a and b .

(ii) Without using a calculator, solve the following simultaneous equations:

$$\begin{cases} 1000^2 x + (2024^2 + 24^2) y = -48 \times 2024 \\ 1000^2 x - (48 \times 2024) y = 2024^2 + 24^2 \end{cases}$$

(b) Someone claims that (E) has no solutions if $a = b$. Do you agree? Explain your answer.

(8 marks)

[illegible]

[illegible]

Section D: Challenging Question (5 marks) (Optional)

Fermat's Little Theorem:

If a is a positive integer, p is a prime number and a is not a multiple of p , then p is a prime factor of $a^{p-1} - 1$ (this is equivalent to say that $a^{p-1} - 1$ is divisible by p).

Using the *Fermat's Little Theorem*, list 4 prime factors of the number $2^{40} - 1$.

(5 marks)

[illegible]

End of Paper