

ST. PAUL'S COLLEGE
F.4 Midyear Examination 2019-2020

MATHEMATICS – Compulsory Part
PAPER 2

Time allowed: 50 minutes

INSTRUCTIONS

1. Read carefully the instructions on the Multiple Choice Answer Sheet. Write down the subject, your name, class and class number in the spaces provided and mark the corresponding boxes with an HB pencil.
2. Write your group number on the top right corner of the answer sheet.
3. All questions carry equal marks.
4. Answer ALL questions. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you lose marks if the answers cannot be captured.
5. You should marked only ONE answer for each question. If you mark more than one answer, you will receive no mark for that question.
6. No marks will be deducted for wrong answers.

There are 30 questions in this paper.

The diagrams in this paper are not necessarily drawn to scale.

Choose the best answer for each question.

1. $0.\overset{\bullet\bullet}{345} =$

- A. 0.35 (correct to 3 significant figures)
- B. 0.345 (correct to 4 decimal places)
- C. 0.3455 (correct to 4 significant figures)
- D. 0.3454 (correct to 4 decimal places)

2. Which of the following **MUST** be true ?

- (1) $1.\overset{\cdot}{3}2\overset{\cdot}{7}$ is a rational number.
- (2) $\sqrt{\frac{48}{3}}$ is an irrational number.
- (3) $\frac{22}{7}$ is an irrational number.

- A. (1) only
- B. (1) and (2) only
- C. (2) and (3) only
- D. (1), (2) and (3)

3. Solve $x^2 = 5x$.

- A. $x = 0$
- B. $x = -5$
- C. $x = 0$ or $x = 5$
- D. $x = -5$ or $x = 5$

4. Find the greatest integer that satisfies the inequality $\frac{5x+3}{-2} \geq 4$.

- A. -4
- B. -3
- C. -2
- D. 1

5. $\frac{(-2xy^{-1})^{-2}}{3x^{-5}} =$

A. $-\frac{4x^3y^2}{3}$

B. $\frac{4x^3y^2}{3}$

C. $\frac{x^3y^2}{6}$

D. $\frac{x^3y^2}{12}$

6. $x^2 - 6x - 4y^2 - 12y =$

A. $(x-2y)(x-2y+6)$

B. $(x-2y)(x+2y+6)$

C. $(x+2y)(x-2y-6)$

D. $(x+2y)(x+2y-6)$

7. Make b the subject of the formula $\frac{a+2b}{a} - 2 = b$.

A. $b = \frac{a+2b}{a} - 2$

B. $b = \frac{a}{2-a}$

C. $b = \frac{2-a}{a}$

D. $a = \frac{b+2}{b}$

8. If $f(x+2) = 3x - 5$, then $f(1) =$

A. -8

B. -5

C. -2

D. 1

9. The points $A = (-3, 6)$, $B = (-1, 3)$ and $C = (5, k)$ lie on the same straight line. Find k .

A. -6

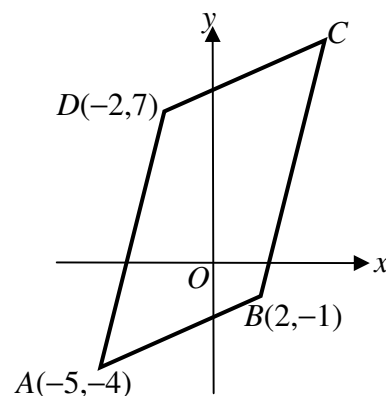
B. -2

C. 6

D. 9

10. In the figure, $ABCD$ is a parallelogram where $A=(-5,-4)$, $B=(2,-1)$ and $D=(-2,7)$.
Find the slope of AC .

- A. $-\frac{7}{5}$
 B. $-\frac{5}{7}$
 C. $\frac{7}{5}$
 D. $\frac{5}{7}$



11. Given two points $P=(-6, 5)$ and $Q=(3, -4)$ in the x - y plane. If R is a point lying on the line segment PQ such that $4PR=5RQ$, then the coordinates of R are

- A. $(-\frac{13}{3}, \frac{40}{9})$
 B. $(-\frac{14}{3}, \frac{41}{9})$
 C. $(-2, 1)$
 D. $(-1, 0)$

12. $i^{2019} =$

- A. -1
 B. 1
 C. $-i$
 D. i

13. If A , B and C are constants such that $3x^2 + 7 \equiv Ax(x-2) + B(x+2) + C$, then $C =$

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

- 14.** If β is a root of the equation $x^2+2x-7=0$, then $3\beta^2+6\beta+10=$
- 11
 - 43
 - 37
 - 31
- 15.** If α and β are the roots of the quadratic equation $x^2+5x+k=0$, then $\alpha^2-5\beta=$
- $-25-k$
 - $25-k$
 - $-5+k$
 - $5+k$
- 16.** A quadratic equation with $(3-2i)$ and $(3+2i)$ as its roots is
- $x^2-6x+13=0$.
 - $x^2+6x-13=0$.
 - $x^2-6x-13=0$.
 - $x^2+6x+13=0$.
- 17.** The quadratic equation $x^2+4x=k-3$ has two distinct real roots, find the range of values of k .
- $k < -1$.
 - $k < 7$.
 - $k > 7$.
 - $k > -1$.
- 18.** If $\frac{yi}{x+6i}=2-3i$ where x and y are real constants, then $y=$
- 9
 - 7
 - 37
 - 39

19. If $\log(a - 3x) = 2$, then $x =$

A. $\frac{a-2}{3}$

B. $\frac{a-100}{3}$

C. $\frac{100a}{3}$

D. $10^{\frac{a-2}{3}}$

20. Which of the following is the greatest ?

A. 500^{2010}

B. 1020^{1500}

C. 1500^{1020}

D. 2010^{500}

21. If $4^x = a$, then $8^{x+1} =$

A. $4a^{1.5}$

B. $8a^{1.5}$

C. $4a^{-0.5}$

D. $8a^{-1.5}$

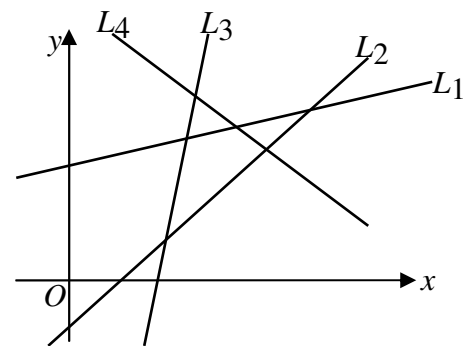
22. In the figure, L_1, L_2, L_3, L_4 are straight lines with slopes m_1, m_2, m_3, m_4 respectively. Which of the following must be true ?

A. $m_4 > m_1 > m_2 > m_3$

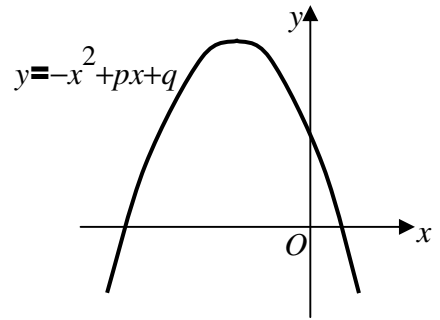
B. $m_3 > m_2 > m_1 > m_4$

C. $m_2 > m_1 > m_4 > m_3$

D. $m_2 > m_1 > m_3 > m_4$

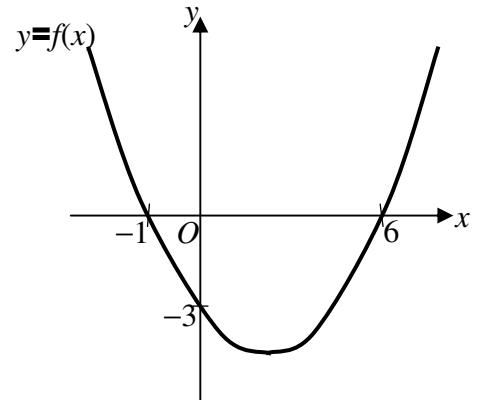


- 23.** The figure shows the graph of $y = -x^2 + px + q$.
Which of the following is true ?



- A. $p > 0, q > 0$
 B. $p > 0, q < 0$
 C. $p < 0, q > 0$
 D. $p < 0, q < 0$

- 24.** The figure shows the graph of $y = f(x)$.
If $f(x)$ is a quadratic function, then $f(x) =$



- A. $\frac{1}{2}(x+1)(x-6)$.
 B. $2(x+1)(x-6)$.
 C. $\frac{1}{2}(x-1)(x+6)$.
 D. $2(x-1)(x+6)$.

- 25.** If $f(x) = \frac{x}{x-1}$, then $f(a) \cdot f\left(\frac{1}{a}\right) =$

- A. 1
 B. $\frac{1}{1-a}$
 C. $-\frac{a}{(a-1)^2}$
 D. $\frac{a}{(a+1)^2}$

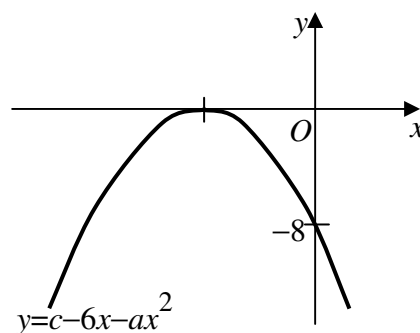
- 26.** If $x > 0$ and $x \neq 1$, which of the following must be true ?

- (1) $\log_5 x^2 = \frac{1}{2\log_x 5}$.
 (2) $\log_8 x = \frac{\log_7 x}{3\log_7 2}$.
 (3) $\log_x 10 = \log x^{-1}$.

- A. (1) only
 B. (2) only
 C. (1) and (3) only
 D. (2) and (3) only

27. In the figure, the graph of $y=c-6x-ax^2$ touches the x -axis. Find a .

- A. $-\frac{8}{3}$
- B. $-\frac{9}{8}$
- C. $\frac{9}{8}$
- D. $\frac{8}{3}$



28. Which of the following statements about the graph of $y=(x+2)^2-9$ is true?

- A. The coordinates of the vertex of the graph are $(-2, 9)$.
- B. The equation of the axis of symmetry of the graph is $x=2$.
- C. The x -intercepts of the graph are -1 and 5 .
- D. The y -intercept of the graph is -5 .

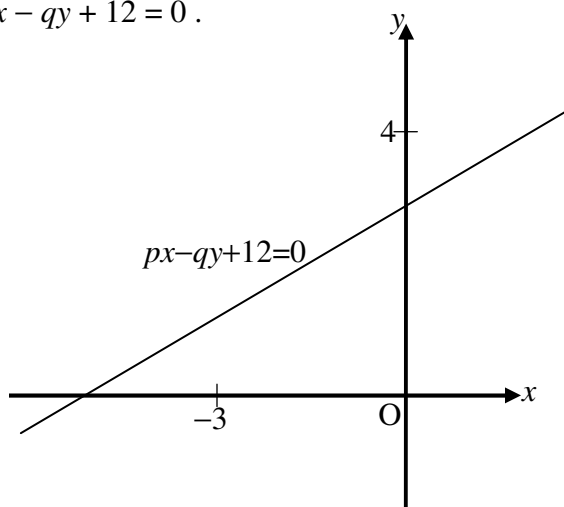
29. If the straight lines $2x + qy - 1 = 0$ and $3x + 2y + 18 = 0$ are perpendicular to each other and intersect at the point A , find the coordinates of A .

- A. $(4, 3)$
- B. $(-4, 3)$
- C. $(4, -3)$
- D. $(-4, -3)$

30. The figure shows the graph of the straight line $px - qy + 12 = 0$. Which of the following are true?

- (1) $p < q$.
- (2) $p < 4$.
- (3) $q < 3$.

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)



END OF PAPER