

HONG KONG DIPLOMA OF SECONDARY
EDUCATION EXAMINATION MOCK PAPER

MATHEMATICS (COMPULSORY PART)
PAPER 2: MULTIPLE CHOICE

Time Allowed: 1 hr 15 min

Total Marks: 45

INSTRUCTIONS TO CANDIDATES:

1. This paper consists of multiple sections.
2. Answer ALL questions in this paper.
3. Write your answers in the spaces provided.
4. Unless otherwise specified, all working must be clearly shown.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

A

QUESTION 1

Solve $x^2 - 5x + 6 = 0$.

(1 mark)

- A. $x = 1$ or $x = 6$
- B. $x = 2$ or $x = 3$
- C. $x = -2$ or $x = -3$
- D. $x = 2$ only

QUESTION 2

The function f is defined by $f(x) = 2x - 3$. Find $f(4)$.

(1 mark)

- A. 5
- B. 8
- C. 11
- D. -5

QUESTION 3

Solve $3x + 7 < 16$.

(1 mark)

- A. $x < 3$
- B. $x > 3$
- C. $x < \frac{23}{3}$
- D. $x \leq 3$

QUESTION 4

Simplify $\frac{2^3 \times 2^4}{2^2}$.

(1 mark)

- A. 2^5
- B. 2^9
- C. 2^3
- D. 2^2

QUESTION 5

The first three terms of an arithmetic sequence are 7, 11, 15 . Find its 10th term.

(1 mark)

- A. 39
- B. 43
- C. 47
- D. 35

QUESTION 6

A quantity y varies directly as x . When $x = 4$, $y = 18$. Find y when $x = 10$.

(1 mark)

- A. 7.2
- B. 45
- C. 28
- D. 14

QUESTION 7

The points $A(1,2)$ and $B(5,10)$ lie on a straight line. Find its gradient.

(1 mark)

- A. 2
- B. $\frac{1}{2}$
- C. 8
- D. -2

QUESTION 8

A circle has centre O and radius 5 cm. A chord is 8 cm long. What is the perpendicular distance from O to the chord?

(1 mark)

- A. 2 cm
- B. 3 cm
- C. 4 cm
- D. $\sqrt{41}$ cm

QUESTION 9

In a right-angled triangle, the acute angle θ has opposite side 6 and hypotenuse 10. Find $\sin \theta$.

(1 mark)

- A. $\frac{3}{5}$
- B. $\frac{4}{5}$
- C. $\frac{5}{3}$
- D. $\frac{3}{4}$

QUESTION 10

How many different arrangements can be made using all the letters of the word MATH?

(1 mark)

- A. 12
- B. 16
- C. 24
- D. 4

QUESTION 11

A fair six-sided die is rolled once. What is the probability of obtaining an even number?

(1 mark)

- A. $\frac{1}{6}$
- B. $\frac{1}{3}$
- C. $\frac{1}{2}$
- D. $\frac{2}{3}$

QUESTION 12

The values 2, 4, 4, 6 have what population standard deviation?

(1 mark)

- A. $\sqrt{2}$
- B. 2
- C. $\sqrt{8}$
- D. 1

QUESTION 13

Which is the equation of a line with gradient -3 and y -intercept 2?

(1 mark)

- A. $y = 3x + 2$
- B. $y = -3x + 2$
- C. $y = -3x - 2$
- D. $y = 2x - 3$

QUESTION 14

If $f(x) = x^2 + 1$, which expression is $f(x - 2)$?

(1 mark)

- A. $x^2 - 3$
- B. $(x - 2)^2 + 1$
- C. $(x + 2)^2 + 1$
- D. $x^2 - 2 + 1$

QUESTION 15

A fair coin is tossed twice. What is the probability of getting exactly one head?

(1 mark)

- A. $\frac{1}{4}$
- B. $\frac{1}{2}$
- C. $\frac{3}{4}$
- D. 1

QUESTION 16

The data are 3, 5, 7, 9. What is the range?

(1 mark)

- A. 4
- B. 6
- C. 7
- D. 12

QUESTION 17

Solve $\log_{10} x = 2$.

(1 mark)

- A. $x = 20$
- B. $x = 100$
- C. $x = 10$
- D. $x = 0.01$

QUESTION 18

Which is a factorisation of $x^2 - 9$?

(1 mark)

- A. $(x - 3)^2$
- B. $(x + 3)^2$
- C. $(x - 3)(x + 3)$
- D. $(x - 9)(x + 1)$

QUESTION 19

The line $y = 2x + 1$ is translated 3 units upwards. What is the equation of its image?

(1 mark)

- A. $y = 2x + 4$
- B. $y = 2x - 2$
- C. $y = 5x + 1$
- D. $y = 2(x + 3) + 1$

QUESTION 20

The two roots of $x^2 - 7x + 10 = 0$ are α and β . Find $\alpha + \beta$.

(1 mark)

- A. -10
- B. -7
- C. 7
- D. 10

QUESTION 21

If y varies inversely as x , and $y = 6$ when $x = 2$, find y when $x = 3$.

(1 mark)

- A. 4
- B. 9
- C. 1
- D. 3

QUESTION 22

A sector has radius 6 cm and central angle 60° . Find its arc length.

(1 mark)

- A. 2π cm
- B. 6π cm
- C. π cm
- D. 12π cm

QUESTION 23

Find the 5th term of the geometric sequence $3, 6, 12, \dots$.

(1 mark)

- A. 24
- B. 36
- C. 48
- D. 96

QUESTION 24

Solve $2(x - 1) = 3x + 4$.

(1 mark)

- A. $x = -6$
- B. $x = 2$
- C. $x = -2$
- D. $x = 6$

QUESTION 25

The circle has equation $(x - 2)^2 + (y + 1)^2 = 16$. What are its centre and radius?

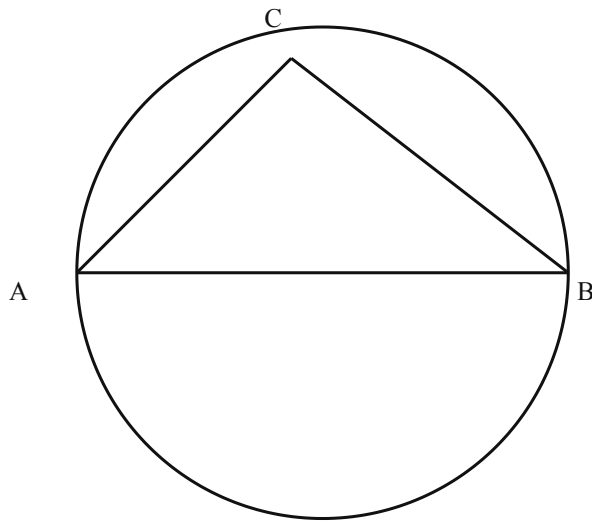
(1 mark)

- A. Centre $(2, -1)$, radius 4
- B. Centre $(-2, 1)$, radius 4
- C. Centre $(2, -1)$, radius 16
- D. Centre $(2, 1)$, radius 16

QUESTION 26

In the diagram, AB is a diameter of the circle and C lies on the circumference. Find $\angle ACB$.

(1 mark)



- A. 45°
- B. 90°
- C. 180°
- D. 60°

QUESTION 27

Which value is the median of 1, 3, 4, 8, 10?

(1 mark)

- A. 3
- B. 4
- C. 5.2
- D. 8

QUESTION 28

If $\tan \theta = 1$ and $0^\circ < \theta < 90^\circ$, find θ .

(1 mark)

- A. 30°
- B. 45°
- C. 60°
- D. 90°

QUESTION 29

Which point lies on the graph $y = x^2$?

(1 mark)

- A. $(2, 4)$
- B. $(2, 2)$
- C. $(4, 2)$
- D. $(-2, -4)$

QUESTION 30

A linear programming feasible region is bounded by $x \geq 0$, $y \geq 0$, $x + y \leq 6$ and $x \leq 4$. What is the maximum value of

$P = 2x + y$?

(1 mark)

- A. 8
- B. 10
- C. 12
- D. 6

B

QUESTION 31

The roots of $x^2 - 4x + 8 = 0$ are α and β . Find $\alpha^2 + \beta^2$. (1 mark)

- A. 8
- B. 16
- C. -8
- D. 0

QUESTION 32

Solve $\log_2(x - 1) + \log_2(x - 3) = 3$. (1 mark)

- A. $x = 5$
- B. $x = -1$
- C. $x = 4$
- D. $x = 3$

QUESTION 33

A polynomial $p(x)$ leaves remainder 5 when divided by $x - 2$, and remainder -1 when divided by $x + 1$. What is the remainder when $p(x)$ is divided by $(x - 2)(x + 1)$? (1 mark)

- A. $2x + 1$
- B. $-2x + 1$
- C. $2x - 1$
- D. $x + 3$

QUESTION 34

Solve $\frac{1}{x-1} + \frac{1}{x+1} = 1$. (1 mark)

- A. $x = 1 \pm \sqrt{2}$
- B. $x = \pm\sqrt{2}$
- C. $x = 2$ only
- D. $x = 0$

QUESTION 35

The sum of the first 20 terms of an arithmetic sequence is 610. Its first term is 2. Find its common difference.

(1 mark)

- A. 2
- B. 3
- C. $\frac{61}{10}$
- D. $\frac{59}{19}$

QUESTION 36

A positive quantity y varies directly as x^2 and inversely as $\sqrt{z}$. When $x = 2$ and $z = 9$, $y = 8$. Find y when $x = 3$ and $z = 4$.

(1 mark)

- A. 18
- B. 27
- C. $\frac{27}{2}$
- D. 12

QUESTION 37

A circular sector has radius 10 cm and arc length 6 cm. Find its area.

(1 mark)

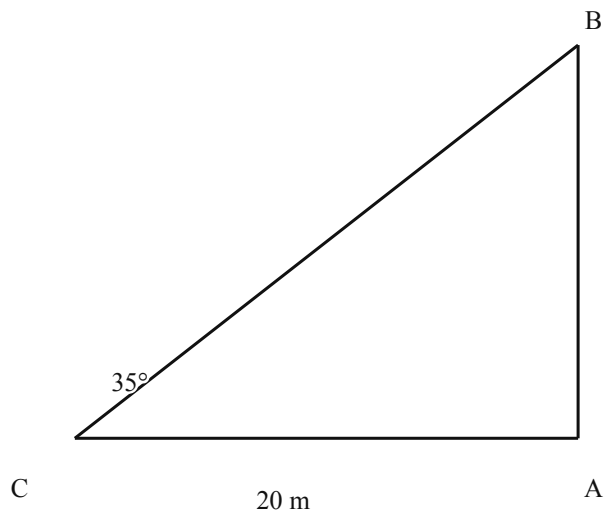
- A. 30 cm^2
- B. 60 cm^2
- C. 16 cm^2
- D. 3 cm^2

QUESTION 38

A vertical tower AB stands on horizontal ground. From point C , 20 m from its foot A , the angle of elevation of its top B is 35° .

Find the height of the tower, to the nearest metre.

(1 mark)



- A. 11 m
- B. 14 m
- C. 29 m
- D. 16 m

QUESTION 39

From 7 distinct people, a committee of 3 is selected. Two particular people, P and Q, must not both be on the committee. How many committees are possible?

(1 mark)

- A. 25
- B. 30
- C. 35
- D. 20

QUESTION 40

A bag contains 4 red and 3 blue counters. Two counters are drawn at random without replacement. Find the probability that they are of different colours. (1 mark)

- A. $\frac{4}{7}$
- B. $\frac{3}{7}$
- C. $\frac{1}{2}$
- D. $\frac{2}{7}$

QUESTION 41

The scores of a group have mean 50 and population standard deviation 8. Each score x is transformed to $y = 3x - 10$. What are the mean and population standard deviation of the transformed scores? (1 mark)

- A. Mean 140, standard deviation 24
- B. Mean 140, standard deviation 14
- C. Mean 40, standard deviation 24
- D. Mean 150, standard deviation 8

QUESTION 42

For $x \neq 0$, the graph of $y = \frac{2}{x-1} + 3$ has which vertical and horizontal asymptotes? (1 mark)

- A. $x = 1$ and $y = 3$
- B. $x = -1$ and $y = 3$
- C. $x = 1$ and $y = 2$
- D. $x = 3$ and $y = 1$

QUESTION 43

A circle has centre $(1, 2)$ and passes through $(4, 6)$. Which is its equation? (1 mark)

- A. $(x-1)^2 + (y-2)^2 = 25$
- B. $(x+1)^2 + (y+2)^2 = 25$
- C. $(x-1)^2 + (y-2)^2 = 5$
- D. $(x-4)^2 + (y-6)^2 = 25$

QUESTION 44

The locus of a point P satisfying $PA = PB$, where $A(-2, 0)$ and $B(4, 0)$, is which line?

(1 mark)



- A. $x = 1$
- B. $y = 0$
- C. $x = 2$
- D. $y = 1$

QUESTION 45

A rectangular garden has perimeter 40 m. Its length is x m and width is $(20 - x)$ m. Which value of x gives the maximum area?

(1 mark)

- A. 5
- B. 10
- C. 15
- D. 20