Sixth Form Entrance Examination

Sample Paper 1

MATHEMATICS

Question paper

Time: 45 minutes

Instructions to candidates:

- This is a multiple-choice test. **Your Answer Sheet will be marked only by a machine**.
- Write in **B or HB pencil** only.

- Check that your name and candidate number are printed correctly on the Answer Sheet.
- Write your name and candidate number in the boxes on the Answer Sheet.

- For each question, indicate the **one** correct answer by <u>**shading**</u> **a box on the Answer Sheet**.
- Refer to the instructions on the Answer Sheet.

- **Each correct answer scores 4 points.**
- **Each incorrect answer loses 1 point**. **Unanswered questions will score 0 points.**
- There are 30 questions in total.

- Rough working can be done in this booklet or on additional plain paper.
- **Only your Answer Sheet will be marked.**

- **You may NOT use a calculator.**

Indicate all your answers on the multiple choice answer sheet provided. This question paper will NOT be marked.

01. What is the value of $\dfrac{a-b}{c}$ when $a = \dfrac{1}{3}$, $b = -\dfrac{1}{2}$, and $c = \dfrac{1}{4}$?

    A -3

    B $-\dfrac{2}{3}$

    C $\dfrac{10}{3}$

    D 11

    E   The correct answer is not given.

02. Which of the following is a sixth of $3 + 4x$?

    A $\dfrac{1}{2} + 4x$

    B $1 + 2x$

    C $\dfrac{1}{2} + \dfrac{2}{3}x$

    D $\dfrac{2 + x}{3}$

    E   The correct answer is not given.

03. What do you get if you divide $5x$ by $\dfrac{5}{x}$?

    A 1

    B 25

    C x^2

    D $25x^2$

    E   The correct answer is not given.

04. Multiply out $(x-4)^2$.

    A $x^2 - 16$

    B $x^2 + 16$

    C $x^2 - 4x + 16$

    D $x^2 - 4x - 16$

    E   The correct answer is not given.

05. Fully factorise the expression $x^2 + 6x - 7$.

    A $(x+3)^2 + 2$

    B $(x+4)(x+2)$

    C $x(x+6) - 7$

    D   The expression cannot be factorised using whole numbers.

    E   The correct answer is not given.

06. Which of the following is a correct simplification of $(x-3)^2 - (x+1)(x-4)$?

    A $5 - 3x$

    B $5 - 9x$

    C $13 - 3x$

    D $13 - 9x$

    E   The correct answer is not given.

07. Which of the following is a correct simplification of $a(a-b) - b(a-c) - b(c-b)$?

    A $a^2 - b^2$

    B $(a-b)^2$

    C $a^2 + b^2$

    D $(a+b)^2$

    E   The correct answer is not given.

08. Simplify $\dfrac{2ab^3}{2a^2b}$.

    A $4ab$

    B $2ab^2$

    C $\dfrac{2b}{a}$

    D $\dfrac{b^2}{a}$

    E   The correct answer is not given.

09. Simplify $\dfrac{x^2 + x}{x^2 - 1}$.

    A $\dfrac{x + 1}{x - 1}$

    B $\dfrac{x}{x - 1}$

    C $-x$

    D   The fraction is already in its simplest form.

    E   The correct answer is not given.

10. Write $5 + \dfrac{1}{x}$ as a single fraction.

    A $\dfrac{6}{x}$

    B $\dfrac{5x + 1}{x}$

    C $\dfrac{5}{x + 1}$

    D $\dfrac{x + 1}{5x}$

    E   The correct answer is not given.

11. Which of the following is a correct rearrangement of $\dfrac{1}{a} + \dfrac{1}{b} = \dfrac{1}{c}$?

    A $a + b = c$

    B $abc = a + b$

    C $a = -bc$

    D $ab = ac + bc$

    E   The correct answer is not given.

12. Make x the subject of $y = \dfrac{x+1}{x-1}$

    A $x = \dfrac{y+1}{y-1}$

    B $x = \dfrac{y-1}{y+1}$

    C $x = \dfrac{y+1}{1-y}$

    D $x = \dfrac{x+1}{y} + 1$

    E   The correct answer is not given.

13. Given that $2x + y = 7$ and $3x - 2y = 5$ find $\dfrac{y}{x}$.

    A $\dfrac{9}{31}$

    B $\dfrac{8}{29}$

    C $\dfrac{17}{11}$

    D $\dfrac{13}{33}$

    E   The correct answer is not given.

14. You are given that $3 - 2x \geq 5$. Which of the following is equivalent to this?

A $5 - x \geq 6$

B $5 - x \leq 6$

C $5 - x \geq 4$

D $5 - x \leq 4$

E   The correct answer is not given.

15. The quantities a and b are in the ratio $3 : 4$. Which of the following is true?

A $3a + 4b = 0$

B $3a - 4b = 0$

C $4a + 3b = 0$

D $4a - 3b = 0$

E   The correct answer is not given.

16. The values A and B are such that

$$A(x + 2) + B(x - 3) \equiv 8x + 6$$

is an identity. This means that the statement is true for all values of x.

What is the value of $A - B$?

A   4

B   5

C   7

D   8

E   The correct answer is not given.

17. Which of the statements A to D is false? If none are false then select option E.

A $3(a + b) \equiv 3a + 3b$

B $3a \times b \equiv 3ab$

C $a \times 3b \equiv 3ab$

D $3(ab) \equiv 3a \times 3b$

E   None of the above statements are false.

18. Which of the statements A to D about the line $3x + 2y = 9$ is false? If none are false then select option E.

   A   The line crosses the x-axis at $(3, 0)$

   B   The line has gradient $\frac{3}{2}$

   C   The line has y-intercept 4.5

   D   The line passes through the point $(1, 3)$

   E   None of the above statements are false.

19. A straight line passes through the points $(a, 0)$ and $(0, b)$. What is the equation of the line?

   A $ax + by = 0$

   B $bx + ay = 0$

   C $bx - ay = ab$

   D $bx + ay = ab$

   E   The correct answer is not given.

20. In triangle ABC shown below, the length of AC is equal to the length of BC. The length of the line from C to the foot of the perpendicular at AB is 4 centimetres.
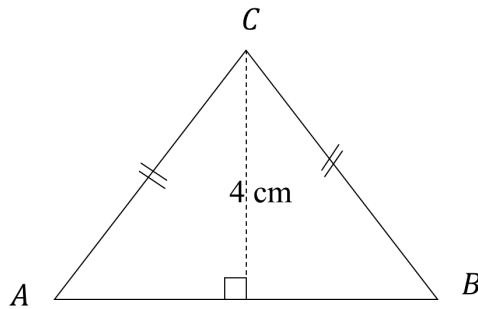
What is the length of the perimeter of the triangle?

   A $8(1 + \sqrt{2})$ centimetres

   B   16 centimetres

   C   56 centimetres

   D   There is not enough information to decide for sure.

   E   The correct answer is not given.

21. A food container is in the shape of a cube of side length four centimetres. Kirsty pours four cubic centimetres of water into the container. What is the depth of the water in the container?

    A   0.25 centimetres

    B   0.5 centimetres

    C   1 centimetres

    D   4 centimetres

    E   The correct answer is not given.

22. A particular sphere has a curious property: The surface area of the sphere (in square centimetres) is *numerically* equal to the volume of the sphere (in cubic centimetres). What is this numerical value?

    A 24π

    B 48π

    C 64π

    D   There is not enough information to decide for sure.

    E   The correct answer is not given.

23. A shop increases the volume of the contents of a jar of sauce by 20%. At the same time, the price of the jar of sauce is increased by 50%. By how much has the price of the sauce increased, per unit volume?

    A   20%

    B   30%

    C $33\frac{1}{3}\%$

    D   40%

    E   The correct answer is not given.

24. Beau walks to school each day. On Tuesday her walking speed is 80% of her walking speed on Monday, and her journey takes M minutes longer. On Wednesday she walks at the same speed as on Monday. How long does it take her?

A $2M$ minutes

B $4M$ minutes

C $5M$ minutes

D   There isn't enough information to decide for sure.

E   The correct answer is not given.

25. Paisely and Misbah are having a walking race. Paisely walks at 3.8 metres per second and Misbah walks at 4.2 metres per second. When they first race Paisely crosses the finish line two seconds after Misbah. They decided to repeat the race, but with Misbah starting *behind* the starting line. Assuming that they walk at the same speeds as before, how far behind the starting line should Misbah start if the race is a tie?

A   0.8 metres

B   7.6 metres

C   8.4 metres

D   There is not enough information to decide for sure.

E   The correct answer is not given.

END OF QUESTIONS