



Mock JMSS Entrance Exam

Mathematics SAMPLE

Question & Answer Book

- You have - Minutes to Complete this Exam.

Materials Supplied

- Question & Answer Book of 7 pages.
- Multiple-Choice Answer Sheet.

Instructions

- Follow the Instructions on your Multiple-Choice Answer Sheet.
- At the end of the examination, place your Multiple-Choice Answer Sheet inside the front cover of this book.
- Answers are at the end of the examination

Students are **not** permitted to bring mobile phones and/or any unauthorised electronic devices into the examination room.

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Student's Name: _____

Student's Email: _____

Date & Time: _____

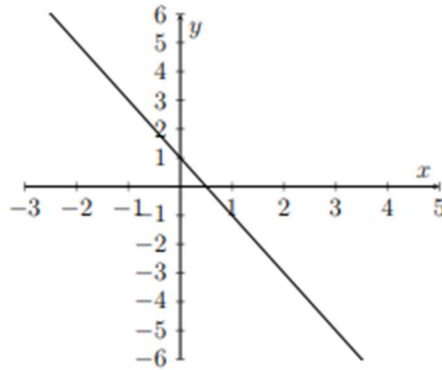
Marks: _____

Section A

Instructions

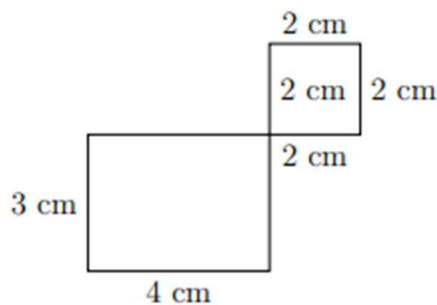
- Answer **all** questions on the Multiple-Choice Answer Sheet.
- Read the information provided carefully before answer before answering the questions associated with it.

Q1. Which equation best represents the graph shown below?



- a) $y = 2x + 1$
- b) $y = -2x + 1$
- c) $y = 2x - 1$
- d) $y = -2x - 1$
- e) $y = x + 1$

Q2. The shape below is a composite of rectangles. What is the area and perimeter of the shape?



- a) Area: 24 cm^2 , Perimeter: 26 cm
- b) Area: 26 cm^2 , Perimeter: 26 cm
- c) Area: 16 cm^2 , Perimeter: 22 cm
- d) Area: 16 cm^2 , Perimeter: 28 cm
- e) Not enough information to find the area and perimeter

Instructions: Q3–Q4

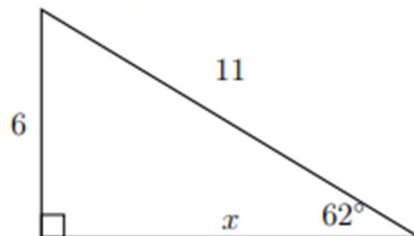
A quadratic equation can be expressed in the form $ax^2 + bx + c = 0$. The solutions for x can be found using the quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. Use this formula to solve the following equations.

Q3. $3x^2 + 7x + 2 = 0$

- a) $x = -2$ or $x = -\frac{1}{3}$
- b) $x = 2$ or $x = \frac{1}{3}$
- c) $x = -2$ or $x = \frac{1}{3}$
- d) $x = 2$ or $x = -\frac{1}{3}$
- e) None of these

Q4. $x^2 - 2x - 8 = 0$

- a) A: $x = -5$ or $x = 1$
- b) B: $x = -4$ or $x = 2$
- c) C: $x = -2$ or $x = 4$
- d) D: $x = 5$ or $x = 1$
- e) E: None of these

Q5. The correct ratio to find x is:

- a) $11 \sin 62^\circ$
- b) $6 \cos 62^\circ$
- c) $\frac{6}{\tan 62^\circ}$
- d) $11 \cos 28^\circ$
- e) $\frac{11}{\tan 62^\circ}$

Instructions: Q6-Q7

An absolute value function like $f(x) = |ax + b|$ can be expressed in piecewise form as:

$$f(x) = \begin{cases} ax + b & x \geq -\frac{b}{a} \\ -(ax + b) & x < -\frac{b}{a} \end{cases}$$
 Use this information to express the following functions.

Q6. Express $f(x) = |-3x + 6|$ in piecewise form.

- a) a) $f(x) = \begin{cases} -3x + 6 & x \geq 2 \\ 3x - 6 & x < 2 \end{cases}$
- b) b) $f(x) = \begin{cases} -3x + 6 & x < 2 \\ 3x - 6 & x \geq 2 \end{cases}$
- c) c) $f(x) = \begin{cases} -3x + 6 & x \geq -2 \\ 3x - 6 & x < -2 \end{cases}$
- d) d) $f(x) = \begin{cases} 3x - 6 & x \geq 2 \\ -3x + 6 & x < 2 \end{cases}$
- e) None of these

Q7. Given $f(x) = |4x + 8|$, what are the x-intercepts of $f(x)$?

- a) $x = 2$
- b) $x = -2$
- c) $x = -2$ and $x = 2$
- d) $x = 3$ and $x = -2$
- e) None of these

Solutions

Mathematics SAMPLE

We recommend not looking at these until you have finished all the questions in the Mock or are really stuck on a question.

Q1:

Y-intercept: The line crosses the y-axis at (0, 1), so $b = 1$

Slope: Using points (0, 1) and (1, -1), the slope is $(-1 - 1) / (1 - 0) = -2$

Equation: With $m = -2$ and $b = 1$, the equation is $y = -2x + 1$

Answer: b) $y = -2x + 1$

Q2:

Area:

Rectangle 1 (Bottom): $4 \text{ cm} * 3 \text{ cm} = 12 \text{ cm}^2$

Rectangle 2 (Top): $2 \text{ cm} * 2 \text{ cm} = 4 \text{ cm}^2$

Total Area: $12 + 4 = 16 \text{ cm}^2$

Perimeter:

Sum of outer sides: $2 + 2 + 2 + 2 + 4 + 3 + 4 + 3 = 22 \text{ cm}$

Answer: c) Area: 16 cm^2 , Perimeter: 22 cm

Q3:

Apply the quadratic formula to the equation:

$$a = 3, b = 7, c = 2$$

$$x = [-7 \pm \sqrt{(7^2 - 4 * 3 * 2)}] / (2 * 3)$$

$$x = [-7 \pm \sqrt{(49 - 24)}] / 6$$

$$x = [-7 \pm \sqrt{25}] / 6$$

$$x = [-7 \pm 5] / 6$$

Solve for x:

$$x_1 = (-7 + 5) / 6 = -2/6 = -1/3$$

$$x_2 = (-7 - 5) / 6 = -12/6 = -2$$

Answer: a) $x = -1/3$ or $x = -2$

Q4:

Apply to the equation:

$$a = 1, b = -2, c = -8$$

$$x = [-(-2) \pm \sqrt{(-2)^2 - 4 * 1 * -8}] / (2 * 1)$$

$$x = [2 \pm \sqrt{4 + 32}] / 2$$

$$x = [2 \pm \sqrt{36}] / 2$$

$$x = [2 \pm 6] / 2$$

Solve for x:

$$x_1 = (2 + 6) / 2 = 8 / 2 = 4$$

$$x_2 = (2 - 6) / 2 = -4 / 2 = -2$$

Answer: c) $x = -2$ or $x = 4$.**Q5:**

Identify Sides:

- Angle: 62°

- Opposite: 6

- Adjacent: x

Choose Ratio: We need Opposite and Adjacent, so use tangent (tan).

Set up:

$$\tan(62^\circ) = \text{Opposite} / \text{Adjacent}$$

$$\tan(62^\circ) = 6 / x$$

$$x = 6 / \tan(62^\circ)$$

Answer: c) $6 / \tan(62^\circ)$ **Q6:**Find the "turning point": The absolute value expression changes behaviour when $-3x + 6 = 0$.

$$-3x + 6 = 0$$

$$-3x = -6$$

$$x = 2$$

Define intervals and expressions:

For $x \geq 2$: $-3x + 6$ is less than or equal to 0, so $|-3x + 6| = -(-3x + 6) = 3x - 6$

For $x < 2$: $-3x + 6$ is greater than 0, so $|-3x + 6| = -3x + 6$

Piecewise Function:

$$f(x) = \begin{cases} 3x - 6 & \text{if } x \geq 2 \\ -3x + 6 & \text{if } x < 2 \end{cases}$$

Answer: d) $f(x) = \begin{cases} 3x-6, & x \geq 2; \\ -3x+6, & x < 2 \end{cases}$

Q7:

Set $f(x)$ to 0:

$$|4x + 8| = 0$$

Solve for the inside of absolute value

$$4x + 8 = 0$$

$$4x = -8$$

$$x = -2$$

Answer: b) $x = -2$

End of Solutions
