UNIT TEST #011 | Australian Curriculum Mathematics | UTM8T2U3

ACACIA TUTORING

Linear Equations, Inequalities, and Linear Relationships

8 Unit Test

Free and always will be!

Instructions: Read all questions carefully to ensure you understand what is being asked. When completing your official tests / exams, your grade will be based upon your: **understanding, fluency, reasoning, and problem solving,** so ensure you show all lines of working and draw accurate, labelled diagrams where necessary. (ACiQ|9.0 Mathematics standard elaborations found on final page (general assessment marking standards)). [Practise tests are marked out of a score of 10]. For multiple choice questions, tick or fill in the circle next to the corresponding letter under the question.

Check your work if you have time. *Remember:* you don't have to start at question one, it's always best to firstly look through the test, highlight the easy looking questions and complete them first, then secondly, go back through and work on the harder questions. Good luck! And remember to breathe!

$$\sum = \frac{\quad}{10} = \quad \%$$

Part 1: Multiple Choice (4 marks)

Question 1:

a) Which of these equations represents a linear relationship?

A. $y = x^2 + 1$ **B.** $y = 2x + 3$ **C.** $y = \frac{1}{x}$ **D.** $y = \sqrt{x}$

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Space for Q1a...

b) Solve the equation to find the value of ' x ' : $2x + 26 = 13$.

◯ **A** ◯ **B** ◯ **C** ◯ **D**

A. $x = \frac{-13}{2}$ **B.** $x = \frac{39}{2}$ **C.** $x = -7.5$ **D.** $x = \frac{13}{2}$

Space for Q1b...

Question 2:

a) The slope of a line passing through the points $(2, 5)$ **and** $(4, 9)$ **is:**

A. 4 **B.** 2 **C.** -2 **D.** -4

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Space for Q2a...

b) Which of the following represents an inequality?

A. $y^2 > x + 3$ **B.** $y^2 = x^2 + 3$ **C.** $y = x^2 - 3^2$ **D.** $y = x \ and \ 3$

◯ A ◯ B ◯ C ◯ D

Space for Q2b...

Part 2: Short Answer (2 marks)

Question 3:

a) Given the equation $y = 3x - 4$, identify the slope and the y-intercept.

b) Solve: $\frac{2y}{10} - 1 = \frac{y}{10} + 2$.

Question 4:

a) Construct a table of values for the equation $y = 2x + 1$ **for** $x = (-1, 0, 1)$**.**

b) Solve $-3x + 12 > 6$**.**

Part 3: Problem Solving (4 marks)

Question 5:

a) A linear relationship is given by the equation $y = -2x + 5$. Find the $x-intercept$ and $y-intercept$ of the line. Draw the graph of this equation on the coordinate plane.

b) Graph the solution to $-x < 1$ on a number line.

Question 6:

a) A taxi company charges $\$2$ for starting the trip and $\$0.50\ per\ kilometre$ traveled. Write the linear equation that represents the cost (C) of a trip based on the distance (d) in $kilometres$. How much would a $10\,km$ trip cost?

b) You have $\$35$ to spend on books, each costing $\$4$. Write and solve an inequality to find how many books you can buy.

Solutions

1a. (0.5 marks)

B. $y = 2x + 3$ - This is the only equation where y increases or decreases at a constant rate with respect to x, which is characteristic of a linear relationship.

b. (0.5 marks)

A. $x = \dfrac{-13}{2}$

$2x + 26 = 13$

Subtract 26 from both sides:

$$\rightarrow 2x + 26 - 26 = 13 - 26$$
$$2x = -13$$

Divide by 2 :

$$\frac{2x}{2} = \frac{-13}{2}$$
$$x = \frac{-13}{2}.$$

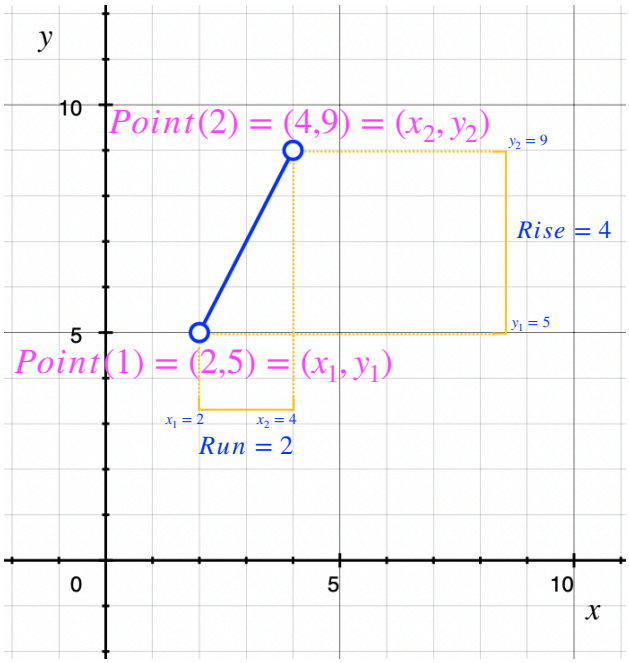
2a. (0.5 marks)

B . 2 - Slope is calculated as:

$Point(2) = (4,9) = (x_2, y_2)$

$Point(1) = (2,5) = (x_1, y_1)$

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9-5}{4-2}$$
$$= \frac{4}{2}$$
$$= 2.$$
$$= \frac{2}{1} = \frac{\text{Rise}}{\text{Run}}$$



b. (0.5 marks)

A. $y^2 > x + 3$

3a. (1 mark)

$$y = 3x - 4$$

$slope\,(m) = 3,$

$y - intercept\,(b) = -4.$

b. (1 mark)

$$\frac{2y}{10} - 1 = \frac{y}{10} + 2\,.$$

Get rid of the fractions by multiplying every term by 10 :

$$\frac{2y}{\cancel{10}} \cdot \cancel{10} - 1 \cdot 10 = \frac{y}{\cancel{10}} \cdot \cancel{10} + 2 \cdot 10$$

$$2y - 10 = y + 20$$

Subtract y from both sides:

$$2y - y - 10 = y \cancel{-y} + 20$$

$$y - 10 = 20$$

Add 10 to both sides:

$$y \cancel{-10} \cancel{+10} = 20 + 10$$

$$y = 30\,.$$

4a. (1 mark)

Substitute the values for $x = (-1, 0, 1)$, into the equation $y = 2x + 1$:

$$x = -1 \rightarrow 2 \times (-1) + 1$$
$$= -1\,,$$
$$x = 0 \rightarrow 2 \times (0) + 1$$
$$= 1\,,$$
$$x = 1 \rightarrow 2 \times (1) + 1$$
$$= 3\,.$$

x	y
-1	-1
0	1
1	3

b. (1 mark)

Divide both sides by -3, reversing the inequality:

$$-3x + 12 > 6$$

$$\frac{\cancel{-3}x}{\cancel{-3}} + \frac{12}{-3} < \frac{6}{-3}$$

$$x - 4 < -2\,.$$

$$x \cancel{-4} \cancel{+4} < -2 \;+4\,.$$

$$x < 2$$

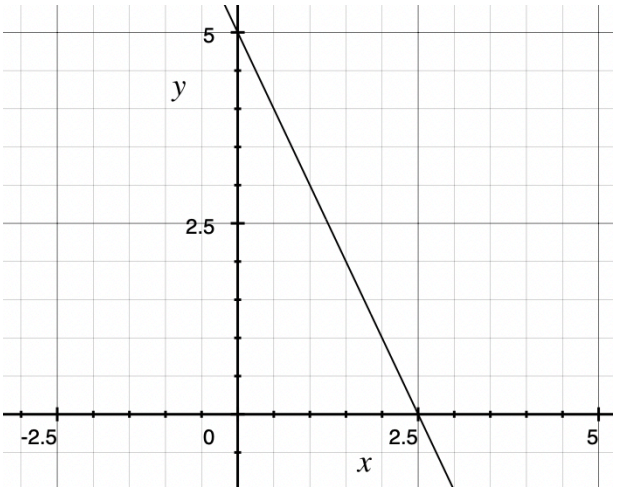
$$x < 2\,.$$

5a. (1 mark)

To find the y-intercept, set x to 0 :

$$y = -2 \times (0) + 5,$$
$$y = 0 + 5,$$
$$y - intercept = 5.$$

The $y - intercept$ is at $(0, 5)$.



To find the x-intercept, set y to 0 :

$$0 + 2x = \cancel{-2x} + \cancel{2x} + 5,$$
$$\rightarrow 2x = 5,$$
$$\frac{\cancel{2}x}{\cancel{2}} = \frac{5}{2},$$
$$x - intercept = \frac{5}{2} = 2.5.$$

The x-intercept is at $\left(\frac{5}{2}, 0\right)$.

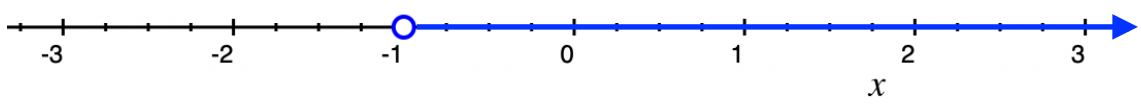
Draw a set of axes, with $x - values$ between 0 and 5, and $y - values$ between 0 and 5. Then, draw in the two points you have calculated (the $x - intercept$ and the $y - intercept$). After this, use a ruler to draw a straight line between the two points:

b. (1 mark)

Firstly solve the inequality:

$$-x < 1$$
$$-1 \times x < 1$$
$$\frac{\cancel{-1} \times x}{\cancel{-1}} > \frac{1}{-1}$$
$$x > -1.$$

Then graph; draw an open circle at -1 and shade all points to the right:



6a. (1 mark)

The equation is $C = 0.50d + 2$.

For a $10\,km$ trip: $C = 0.50\,\$/\cancel{km} \times (10\,\cancel{km}) + 2$

$$= \frac{5}{\cancel{10}} \times \cancel{10} + 2$$
$$= 5 + 2$$
$$= \$7.$$

The cost would be $\$7$.

b. (1 mark)

Let b be the number of books

The inequality is: $4b \leq 35$

Solve:

$$\frac{4b}{4} \leq \frac{35}{4}$$

$b \leq 8.75$, we can't buy 0.75 of a book, so we round down to 8 :

$b \leq 8$.

You can buy up to 8 books.

$$\sum = \frac{}{10} = \quad \%$$

General Assessment Marking Standards

Remember: When your official tests are marked, they won't be a score out of 10, they will be a grade (A,B,C,D,E) based on the following standards:

ACiQ | v9.0

Year 8 Mathematics standard elaborations

		A	B	C	D	E
		The folio of student work contains evidence of the following:				
Mathematical proficiencies	Understanding	accurate and consistent identification, representation, description and connection of mathematical concepts and relationships in complex unfamiliar, complex familiar, and simple familiar situations	accurate identification, representation, description and connection of mathematical concepts and relationships in complex familiar and simple familiar situations	identification, representation, description and connection of mathematical concepts and relationships in simple familiar situations	partial identification, representation and description of mathematical concepts and relationships in some simple familiar situations	fragmented identification, representation and description of mathematical concepts and relationships in isolated and obvious situations
	Fluency	choice, use and application of comprehensive facts, definitions, and procedures to find solutions in complex unfamiliar, complex familiar, and simple familiar situations	choice, use and application of effective facts, definitions, and procedures to find solutions in complex familiar and simple familiar situations	choice, use and application of facts, definitions, and procedures to find solutions in simple familiar situations	choice and use of partial facts, definitions, and procedures to find solutions in some simple familiar situations	choice and use of fragmented facts, definitions and procedures to find solutions in isolated and obvious situations
	Reasoning	comprehensive explanation of mathematical thinking, strategies used, and conclusions reached in complex unfamiliar, complex familiar, and simple familiar situations	detailed explanation of mathematical thinking, strategies used, and conclusions reached in complex familiar and simple familiar situations	explanation of mathematical thinking, strategies used, and conclusions reached in simple familiar situations	partial explanation of mathematical thinking, strategies used, and conclusions reached in some simple familiar situations	fragmented explanation of mathematical thinking, strategies used, and conclusions reached in isolated and obvious situations
	Problem-solving	purposeful use of problem-solving approaches to find solutions to problems.	effective use of problem-solving approaches to find solutions to problems.	use of problem-solving approaches to find solutions to problems.	partial use of problem-solving approaches to make progress towards finding solutions to problems.	fragmented use of problem-solving approaches to make progress towards finding solutions to problems.

Key shading emphasises the qualities that discriminate between the A–E descriptors

IMPORTANT: At Acacia Tutoring we believe all educational resources should be free, as education, is a fundamental human right and a cornerstone of an equitable society. By removing financial barriers, we ensure that all students, regardless of their socioeconomic background, have equal access to high-quality learning materials. This inclusivity promotes fairness, helps bridge achievement gaps, and fosters a society where every individual can reach their full potential.

Furthermore, free resources empower teachers and parents, providing them with tools to support diverse learners and improve outcomes across communities. Education benefits everyone, and making resources universally accessible ensures we build a more informed, skilled, and prosperous future for all.

All documents are formatted as a **.pdf** file, and are completely **FREE** to use, print and distribute - as long as they are not sold or reproduced to make a profit.

N.B. Although we try our best to produce high-quality, accurate and precise materials, we at Acacia Tutoring are still human, these documents may contain errors or omissions, if you find any and wish to help, please contact Jason at info@acaciatutoring.com.au .