



Integers, Powers, and Prime Numbers

7 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!

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

Part 1: Multiple Choice (2 marks)

Question 1:

a) Which property of numbers is being demonstrated by the equation $4 + (3 + 2) = (4 + 3) + 2$?

A. Commutative

B. Associative

C. Distributive

D. Identity

☐ **A**

☐ **B**

☐ **C**

☐ **D**

Space for Q1a...



b) Which integer is greater, -5 or 0 ?

A. -5

B. 0

C. Neither

D. Both

☐ **A**

☐ **B**

☐ **C**

☐ **D**

Space for Q1b...

Question 2:

a) A diver starts at -12 metres below sea level and then descends another 8 metres. How deep is the diver now?

A. 2 m

B. -4 m

C. 20 m

D. -20 m

☐ **A**

☐ **B**

☐ **C**

☐ **D**

Space for Q2a...

b) Identify the next number in the sequence: $5, 5, 10, 15, \dots$

A. 20

B. 25

C. 30

D. 35

☐ **A**

☐ **B**

☐ **C**

☐ **D**

Space for Q2b...



Part 2: Short Answer (4 marks)

Question 3:

a) A team's score decreases by 5 points in the first quarter and then increases by 15 points in the second, then increases by 3 points in the third quarter and they lose 3 points in the final part of the game, if they started at 0, what is their score now?

b) Identify the next two numbers in the pattern: 0, 1, 1, 2, 3, 5, 8 ...

Question 4:

a) Simplify the expression: $5 \times (-2) + 3$.



b) Express the number 128 as a product of powers of prime numbers using index notation. Show your working using a factor tree.

Part 3: Problem Solving (4 marks)

Question 5:

a) A student is designing a square garden bed for a school project and needs to calculate its area and side length. A square garden bed has an area of $144 m^2$. What is the side length of the garden bed?



b) A student is planning a school event and needs to estimate the number of tiles for a square floor. A square floor has an area of approximately 160 m^2 . Estimate the side length of the floor by finding the square root of the nearest perfect square.

Question 6:

In a school canteen, a student estimates the total cost of their lunch to budget their pocket money. A sandwich costs \$3.00 , a juice costs \$1.90 , and a fruit cup costs \$1.25 .

a) Round each item's cost to the nearest dollar and estimate the total cost.



b) Calculate the actual total cost and compare it to your estimate. Was your estimate reasonable? Explain.



Solutions

1a. (0.5 marks)

B. Associative .

The associative property states that the way in which numbers are grouped in addition does not change the sum.

b. (0.5 marks)

B. 0 .

0 is greater than -5 because 0 is to the right of -5 on the number line.

2a. (0.5 marks)

D. -20 m .

New depth: $-12 - 8 = -20\text{ metres}$.

b. (0.5 marks)

B. 25 .

This is the fibonacci sequence starting at 5 . (Each term is the sum of the previous two terms).

3a. (1 mark)

Score after two quarters: $0 - 5 + 15 + 3 - 3 = +10$.

b. (1.5 marks)

0, 1, 1, 2, 3, 5, 8, 13, 21 .

Each number in the sequence is given by the sum of the previous two numbers.

I.e. $13 = 5 + 8$, and $21 = 13 + 8$. This sequence (of numbers) is known as the Fibonacci sequence.

4a. (1 mark)

$$\begin{aligned} & 5 \times (-2) + 3 \\ & = +5 \times (-2) + 3 \\ & = -10 + 3 \\ & = -7 . \end{aligned}$$

($+$ \times $-$ $=$ $-$) If signs are:

opposite \rightarrow change to $-$

same \rightarrow change to $+$

Rules for multiplying (and dividing) positive and negative numbers =

If signs are:

Opposite

($+$ \times $-$ $=$ $-$)

($-$ \times $+$ $=$ $-$)

Same

($+$ \times $+$ $=$ $+$)

($-$ \times $-$ $=$ $+$)



b. (1 mark)

Method: Use a factor tree to find prime factors.

Step 1, Break down 128 :

$$128 = 2 \times 64$$

$$64 = 2 \times 32$$

$$32 = 2 \times 16$$

$$16 = 2 \times 8$$

$$8 = 2 \times 4$$

$$4 = 2 \times 2$$

Step 2, Collect prime factors :

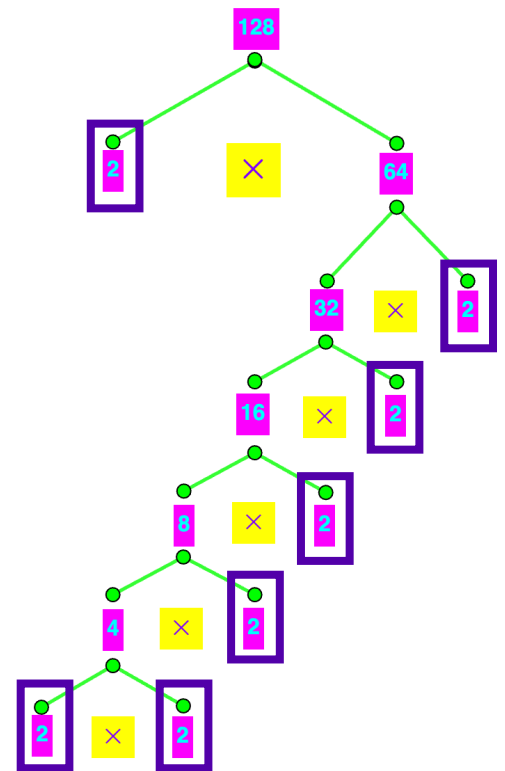
$$128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

Step 3, Write in index notation :

$$2 \text{ appears } 7 \text{ times : } 2^7$$

Final answer :

$$128 = 2^7$$



5a. (1 mark)

Side Length for $144 m^2$

$$\text{Area} = \text{side}^2$$

$$= 144 m^2$$

$$\text{Side length} = \sqrt{144}$$

$$= 12 m \text{ (since } 12 \times 12 = 144 \text{)}.$$

b. (1 mark)

Estimate Side Length

Find perfect squares near 160 :

$$12^2 = 144, 13^2 = 169.$$

160 is closer to 169 than 144, $(169 - 160 = 9, 160 - 144 = 16)$.

Estimated side length:

$$\sqrt{169} = 13 m.$$

6a. (1 mark)

Rounding and Estimation

Sandwich :

$$\$3.00 = \$3 \text{ (already at nearest whole number).}$$

Juice :

$$\$1.90 \approx \$2 \text{ (since } 0.90 \geq 0.50 \text{ , round up).}$$

Fruit cup:

$$\$1.25 \approx \$1 \text{ (since } 0.25 < 0.5 \text{ , round down).}$$

Estimated total:

$$\$3 + \$2 + \$1 = \$6.$$



b. (1 mark)

Actual Total and Comparison
Actual total:

$$\$3.00 + \$1.90 + \$1.25$$

$$\$3.00 + \$1.90 = \$4.90$$

$$\$4.90 + \$1.25 = \$6.15$$

Difference:

$$\$6.15 - \$6.00 = \$0.15 .$$

Reasonableness: The estimate of \$6 is very close to the actual cost \$6.15 , differing by only \$0.15 (15c) . This is reasonable because rounding to the nearest dollar simplifies calculations for quick budgeting, and the small difference shows the estimate is practical for planning purposes.

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



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 7 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 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

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