ACACIA TUTORING

Integers and Index Laws

7 μnit Test

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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.

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

Part 1: Multiple Choice (2 marks)

Question 1:

What is the result of $-5+3$?

A. -8 **B.** -2 **C.** 2 **D.** 8

○ A ○ B ○ C ○ D

Working out space for question 1:

Question 2:

Simplify the expression $2^3 \times 2^2$ using index laws:

A. 2^5 **B.** 2^6 **C.** 4^5 **D.** 4^6

○ A ○ B ○ C ○ D

Working out space for question 2:

Part 2: Short Answer (4 marks)

Question 3:

Perform the following calculations with integers:

a) $-7-(-4)$

b) $6 \times (-2)$

c) $\dfrac{-12}{3}$

a b. c.

Question 4:

Simplify the following expressions using index laws:

a) $3^4 \div 3^2$,
b) $(5^2)^3$

a

b.

Part 3: Problem Solving (4 marks)

Question 5:

A temperature gauge reads $-5^{\circ}C$ at $noon$. By $3\,pm$, the temperature has dropped by another 7 degrees. What is the temperature at $3\,pm$?

Question 6:

If you have 2^3 apples and you doubled the amount to the power of 2 (i.e., multiply by 2^2), how many apples do you have now?

Solutions

1. (1 mark)

B. -2

- Subtracting a positive number from a negative number results in a more negative number.

2. (1 mark)

A. 2^5

- When multiplying powers with the same base, add the exponents:

$\rightarrow 2^{3+2}$

$= 2^5$.

3. (2 marks)

$\rightarrow$ a) $-7-(-4)$

$=-7+4$

$=-3$

b) $6\times(-2)$

$=-12$

c) $\dfrac{-12}{3}$

$=-4$.

If signs are:

opposite → change to −

same → change to +

Rules for multiplying (and dividing) positive and negative numbers

If signs are:

Opposite

$(+\times-=-)$

$(-\times+=-)$

Same

$(+\times+=+)$

$(-\times-=+)$

4. (2 marks)

a) $3^4 \div 3^2$

$=3^{4-2}$

$=3^2$

$=9$.

b) $(5^2)^3$

$=5^{2\times3}$

$=5^6$.

5. (2 marks)

Temperature at $3\,PM = -5^{\circ}C - 7^{\circ}C$

$= -12^{\circ}C$.

6. (2 marks)

Original apples: $2^3 = 8$

Doubled to the power of two: $2^2 = 4$

Apples, doubled to the power of two: $2^3 \times 2^2$

$$= 2^{3+2}$$
$$= 2^5$$
$$= 32$$

OR

$$2^3 \times 2^2$$
$$= 8 \times 4$$
$$= 32$$

Therefore, you now have 32 apples.

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

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Fractions and Decimals

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

Part 1: Multiple Choice (2 marks)

Question 1:

Convert the fraction $\frac{3}{10}$ to a decimal:

A. 0.03 **B.** 0.3 **C.** 3.0 **D.** 30.0

○ A ○ B ○ C ○ D

Working out space for question 1:

Question 2:

Which of the following is equivalent to 0.75 ?

A. $\frac{1}{4}$ **B.** $\frac{3}{4}$ **C.** $\frac{4}{3}$ **D.** $\frac{3}{5}$

◯ **A** ◯ **B** ◯ **C** ◯ **D**

Working out space for question 2:

Part 2: Short Answer (4 marks)

Question 3:

Perform the following operations:

a) Add $\frac{1}{4}$ and $\frac{1}{2}$.

b) Subtract 0.8 *from* 2.3.

a. b.

Question 4:

Convert the following:

a) The decimal 0.6 to a fraction.

b) The fraction $\frac{5}{8}$ to a decimal.

Part 3: Problem Solving (4 marks)

Question 5:

You have $\frac{3}{4}$ of a pizza, and you eat $\frac{1}{3}$ of what you have. How much pizza do you have left?

Question 6:

A store sells sour straps in packages of $0.25\,kg$ each. If you buy 3 packages, how many $kilograms$ of sour straps do you have?

Solutions

1. (1 mark)

B. 0.3

- Dividing 3 by 10 gives you 0.3 .

2. (1 mark)

B. $\frac{3}{4}$

- 0.75 is the same as 75 hundredths or $\frac{3}{4}$.

3. (2 marks)

a) Adding fractions: $\frac{1}{4}+\frac{1\times 2}{2\times 2}$

$$=\frac{1}{4}+\frac{2}{4}$$

$$=\frac{1+2}{4}$$

$$=\frac{3}{4}.$$

b) Subtracting decimals: $2.3-0.8$

$$=1.5.$$

4. (2 marks)

a) 0.6 as a fraction is $\frac{6}{10}$,

$$=\frac{6\div 2}{10\div 2}.$$

$$=\frac{3}{5}.$$

b) $\frac{5}{8}$ as a decimal is 0.625 (divide 5 by 8) .

5. (2 marks)

$\frac{1}{3}$ of $\frac{3}{4}$ of a pizza is

$$= \frac{1}{3} \times \frac{3}{4}$$

$$= \frac{1 \times \cancel{3}}{\cancel{3} \times 4}.$$

$$= \frac{1}{4}.$$

Pizza left:

$$\frac{3}{4} - \frac{1}{4}$$

$$= \frac{3-1}{4}$$

$$= \frac{2 \div 2}{4 \div 2}$$

$$= \frac{1}{2}.$$

6. (2 marks)

Total candy bought: 3×0.25 kg

$$= 0.75\, kg.$$

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

Algebra and Equations

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

Part 1: Multiple Choice (2 marks)

Question 1:

Which expression shows 3 less than a number x ?

A. $x + 3$ **B.** $x - 3$ **C.** $3 - x$ **D.** $3x$

○ A ○ B ○ C ○ D

Working out space for question 1:

Question 2:

Solve for x in the equation $2x = 8$:

A. $x = 4$ **B.** $x = 2$ **C.** $x = 6$ **D.** $x = 16$

○ A ○ B ○ C ○ D

Working out space for question 2:

Part 2: Short Answer (4 marks)

Question 3:

Simplify the algebraic expression: $5x + 3x - 2x$ **.**

Question 4:

Solve the following equation: $x + 7 = 15$ **.**

Part 3: Problem Solving (4 marks)

Question 5:

If a box contains x **apples and you add** 5 **more apples, you have** 12 **apples. Write and solve an equation to find** x **.**

Question 6:

The cost of one ticket to a concert is $\$20$. If you have $\$100$, how many tickets can you buy? Write an equation and solve it.

Question 7: Extension Question

a) **Assuming on the digital clock the time separator does not flash with the seconds, why is the digital clock *less precise* than the analogue clock, when reading the time?**

b) **Which clock is more *accurate*?**

Solutions

1. (1 mark)

B.

$x - 3$

- " 3 less than a number x " translates directly to $x - 3$.

2. (1 mark)

A.

$x = 4$.

- Divide both sides by 2 to solve for x :

$$2x = 8$$
$$\frac{\cancel{2}x}{\cancel{2}} = \frac{8}{2}$$
$$x = 4 .$$

3. (2 marks)

Combine like terms:

$$\begin{aligned} &5x + 3x - 2x \\ &= (5 + 3 - 2)x \\ &= 6x . \end{aligned}$$

4. (2 marks)

Subtract 7 from both sides:

$$x + 7 = 15$$
$$x \cancel{+7} \cancel{-7} = 15 - 7$$
$$x = 8 .$$

5. (2 marks)

Subtract 5 from both sides:

$$x + 5 = 12$$
$$x \cancel{+5} \cancel{-5} = 12 - 5$$
$$x = 7 .$$

6. (2 marks)

Let t be the number of tickets.

The equation is:

$$\begin{aligned} 20t &= 100 \\ \frac{\cancel{20}t}{\cancel{20}} &= \frac{100}{20} \\ t &= \frac{100}{20} \\ t &= 5. \end{aligned}$$

Therefore 5 tickets can be bought with $\$100$.

7a. Extension Question

The analogue clock on the right is the more precise time reading device, as the minute hand will slowly move as the seconds tick (even though there is no seconds hand); So if you look closely at the minute hand, and its position between the minutes, you can tell where the seconds are approximately up to. Therefore, it is possible to more precisely tell the time with the analogue clock.

(Precision deals with how many increments there are between units, e.g. a $30\,cm$ ruler with only centimetre marks is less precise than a $30\,cm$ ruler that also has mm marks. - In this case, because it is possible to approximate the seconds on the analogue clock and it is not possible to approximate the seconds on he digital clock).

b.

Assuming that both clocks have been correctly set the precise time, the digital clock will be more accurate, as it contains a quartz timing device which generally 'keeps time better' than an analogue clock (this isn't always true, very high end mechanical clock will keep a more accurate time than some digital clocks). **However, if neither clock has been set to the correct time,** then neither will be more precise than the other.

(Accuracy deals with correctness, the closer a measurement is to being correct, the more accurate it is).

Essentially, accurate = correctness of measurement, i.e. is the measurement correct?; Precise = fineness of the scale on the measuring device / i.e. how many increments are there on the measuring device?

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

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:

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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, 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

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