Grade 9 Academic 2010-2012

1. Number Sense and Algebra Strand

Proportional Reasoning Legend

- Precursor
- Partial
- Fully
- Other
Q.1 (MC, KU, 2010, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

What is the value of $6x^2$ when $x = \frac{1}{3}$?

- a $\frac{2}{9}$
- b $\frac{2}{3}$
- c 2
- d 4

Q.2 (MC, KU, 2010, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

Chris has a square garden with an area of 38.4 m$^2$, as shown in the diagram.

He decreases the length of each side by 1.7 m to make a smaller garden.

Which is closest to the perimeter of the smaller garden?

- a 37 m
- b 32 m
- c 25 m
- d 18 m
Q.3 (MC, AP, Winter 2010, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

The sum of the perimeters of two shapes is represented by $13x + 4y$.

The perimeter of one shape is represented by $4x - 2y$.

Which expression represents the perimeter of the other shape?

- a. $9x + 2y$
- b. $9x + 6y$
- c. $17x + 2y$
- d. $17x + 6y$

Q.4 (MC, KU, 2010, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

Consider the expression below.

$3x^2(5x^2 - 2x + 1)$

Which of the following is equivalent to this expression?

- a. $8x^2 - 2x + 1$
- b. $8x^2 + x + 4$
- c. $15x^4 - 2x + 1$
- d. $15x^4 - 6x^3 + 3x^2$

Q.5 (MC, AP, 2010, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

The cylinder below has a volume of 150 cm$^3$.

The cylinder has a height of 8 cm.

Which of the following is closest to the area of the lateral surface of the cylinder?

**Hint:**

- $V_{cylinder} = \pi r^2 h$
- $A_{lateral\ surface} = 2\pi rh$

- a. 38 cm$^2$
- b. 75 cm$^2$
- c. 150 cm$^2$
- d. 300 cm$^2$
6 Part-Time Job

Ezra works part-time at a clothing store. He earns $80 per week plus 6% of the value of his weekly sales.

This week Ezra earns $119.

What is the total value of his sales this week?

Show your work.

Q.1.2.3 (MC, AP, 2011, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)
Q.4.5 (MC, AP, 2011, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

4. Luke designs a garden in the shape of a right triangle as shown below.

3x

x

The total area of the garden is 96 m².

Hint: 
\[ A = \frac{1}{2} bh \]

Which is closest to the value of \( x \) in the diagram?

a. 6 m
b. 8 m
c. 32 m
d. 64 m

Q.6 (OR, TH, 2011, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

5. A square and an equilateral triangle are pictured below.

If the square and the triangle have the same perimeter, what is the value of \( x \)?

- \((5x + 3)\)
- \((7x - 1)\)

\[ \text{Perimeter of square} = \text{Perimeter of triangle} \]

\[ 4(5x + 3) = 3(7x - 1) \]

Solve for \( x \).

a. 2
b. 4
c. 9
d. 15

How High Is It?

6. The cylinder pictured below has a surface area of 660 cm².

Use the following formula to determine the height of the cylinder:

\[ \text{Surface area} = 2\pi r^2 + 2\pi rh \]

Show your work.
Q.1 (MC, KU, 2012, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

What is the value of the expression \( x^2 \) when \( x = \frac{4}{5} \)?

a. \( \frac{8}{5} \)

b. \( \frac{8}{10} \)

c. \( \frac{16}{5} \)

d. \( \frac{16}{25} \)

Q.2 (MC, KU, 2012, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

The volume of a rectangular prism is represented by \( 12x^3 \). The height is represented by \( 3x \).

Which of the following represents the area of the base?

**Hint:**
\[ V = \text{(area of base)}(\text{height}) \]

a. \( 4x^2 \)

b. \( 4x^3 \)

c. \( 9x^2 \)

d. \( 9x^3 \)

Q.3 (MC, AP, 2012, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

A basketball player scores 28 points in a game. She scores 35% of the total team points.

How many points does her team score in total?

a. 63

b. 65

c. 72

d. 80

Q.3 (MC, AP, 2012, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

Which of the expressions below is equivalent to \( 3(4x - 5) - 7(9x - 2) \)?

a. \( -51x - 1 \)

b. \( -51x - 3 \)

c. \( -51x - 7 \)

d. \( -51x - 29 \)
5  Liam sells sandwiches at an arena. He earns $10.50 per hour plus $0.40 for each sandwich he sells.

How many sandwiches does he need to sell during a 6-hour shift to earn $125?

a  158
b  155
c  62
d  12

6  What a Bargain!

Susan buys a tennis racket from a store.

• The tennis racket’s original price is $75.
• All tennis rackets are on sale for 25% off the original price.
• The tennis racket has a scratch, so she receives an additional 10% off the sale price.

How much does Susan pay for her tennis racket, including 13% tax?

Show your work.
Grade 9 Academic  2013

1. Number Sense and Algebra Strand

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<thead>
<tr>
<th>Proportional Reasoning Legend</th>
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<tr>
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Q.1 (MC, AP, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

1. What is the value of $5x^3y^2$ when $x = 2$ and $y = 4$?
   a. 240
   b. 320
   c. 480
   d. 640

Q.2 (MC, KU, expectation: demonstrate an understanding of the exponent rules of multiplication and division, and apply them to simplify expressions)

2. What exponent goes in the box to make the following equation true?
   \[
   \frac{x^\square x^6}{x^2} = x^{12}
   \]
   a. 9
   b. 8
   c. 4
   d. 3

Q.3 (MC, AP, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

3. Mario is making fruit punch by mixing orange juice and pineapple juice in a ratio of 1:3.

   How much pineapple juice should he use to make 3 L of fruit punch?
   a. 0.75 L
   b. 2 L
   c. 2.25 L
   d. 4 L

Q.4 (MC, AP, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

4. Which of the following is a simplified form of the expression $4(5x - 8) - 3(2x - 7)$?
   a. $14x - 11$
   b. $14x - 53$
   c. $26x - 11$
   d. $26x - 53$
Q.5 (MC, AP, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

The square and the triangle below have the same area.

What is the value of $n$?

a 1  

b 2  

C 8  

d 16

Q.6 (OR, TH, expectation: manipulate numerical and polynomial expressions, and solve first-degree equations)

Healthy Fish

James adds vitamin drops to his fish tank to keep his fish healthy.

If James follows the instructions on the bottle of vitamins, how many capfuls should he add to his 350-litre fish tank?

Show your work.

- 2 drops per 5 litres of water
- 1 capful = 40 drops