

*Key*

# SECTION 2 OF REVIEW

*Extra Practice  
Questions*

SECTIONS  
OF REVIEW

# PART 2 - ALGEBRA + NUMBERS

## PART A: MULTIPLE-CHOICE QUESTIONS

1. Which of the following powers is a perfect cube?

- A.  $3^2 = 9$   $\sqrt[3]{9}$  No
  - B.  $5^6 = 1296$   $\sqrt[3]{1296}$  No
  - C.  $6^4 = 1296$   $\sqrt[3]{1296}$  No
  - D.  $9^2 = 81$   $\sqrt[3]{81}$  No
- $5^6 = (5^2)^3$  perfect cube!  
 or  $5^6 = 15625$   
 and  $\sqrt[3]{15625} = 25$

2. Write as a single power:  $\frac{12^3}{4^3} = \left(\frac{12}{4}\right)^3 = 3^3$

- A.  $3^0$
- B.  $3^3$
- C.  $8^3$
- D.  $48^6$

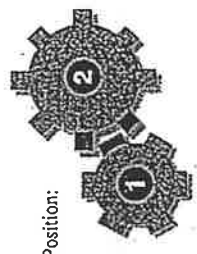
3. Given  $x > 1$ , arrange from the least to the greatest:

- A.  $\frac{1}{\sqrt{x}}, \sqrt{x}, \sqrt[3]{x^2}$
  - B.  $\frac{1}{\sqrt{x}}, \sqrt[3]{x^2}, \sqrt{x}$
  - C.  $\sqrt{x}, \sqrt[3]{x^2}, \frac{1}{\sqrt{x}}$
  - D.  $\sqrt[3]{x^2}, \frac{1}{\sqrt{x}}, \sqrt{x}$
- $\sqrt{x}, \frac{1}{\sqrt{x}}, \sqrt[3]{x^2}$   
 $\downarrow \quad \downarrow \quad \uparrow$   
 $x^{\frac{1}{2}}, (x^{\frac{1}{2}})^{-1}, x^{\frac{2}{3}}$   
 $x^{-\frac{1}{2}}, \sqrt{x}, \sqrt[3]{x^2}$

Can test with a value for  $x$  to check.

4. Two gears are shown below in their starting position.

- Gear 1 has 6 teeth.
- Gear 2 has 8 teeth.
- As Gear 1 turns, it causes Gear 2 to turn at a different rate.
- Gear 1 is rotated until the two gears are back to their starting position.



Starting Position:

What is the minimum number of rotations Gear 1 requires to return to this starting position?

- A. 48 rotations
  - B. 24 rotations
  - C. 4 rotations
  - D. 2 rotations
- $LCM$   
 $6 \quad 8$   
 $3 \quad 2 \quad 4 \quad 2$   
 $2 \cdot 3 \quad 2^3$   
 $LCM = 2^3 \cdot 3 = 8 \cdot 3 = 24$   
 Gear 1 has 6 teeth so  $\frac{24}{6} = 4$  rotations

5. Three students were asked to show steps for simplifying  $\sqrt[3]{1080}$  to  $6\sqrt[3]{5}$ .

Student	Work
Jean	$\sqrt[3]{1080} = \sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5}$ $= (2 \times 3)(\sqrt[3]{5})$ $= 6\sqrt[3]{5}$
Sally	$\sqrt[3]{1080} = \sqrt[3]{216 \times 5}$ $\sqrt[3]{216} = 6$ $\therefore \sqrt[3]{1080} = 6\sqrt[3]{5}$
Mark	$\sqrt[3]{1080} = \sqrt[3]{27 \times 5 \times 8}$ $= 3 \times \sqrt[3]{5} \times 2$ $= 6\sqrt[3]{5}$

Which student made a mistake, if any?

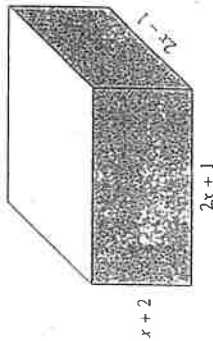
- A. Jean
- B. Sally
- C. Mark
- D. All of them show correct work.

6. Simplify:  $\left(\frac{-54x^6y}{2x^3y^4}\right)^{\frac{4}{3}}$

- A.  $-36x^4y$
- B.  $-\frac{36x^{12}}{y^4}$
- C.  $81x^4y^4$
- D.  $\frac{81x^{12}}{y^4}$**

Handwritten work for Q6:  
 $(-27x^2y^{-3})^{\frac{4}{3}}$   
 $-27^{\frac{4}{3}} x^{\frac{8}{3}} y^{-4}$   
 $(\sqrt[3]{-27})^4 x^{12} y^{-4}$   
 $(-3)^4 x^{12} y^{-4} = \frac{81x^{12}}{y^4}$

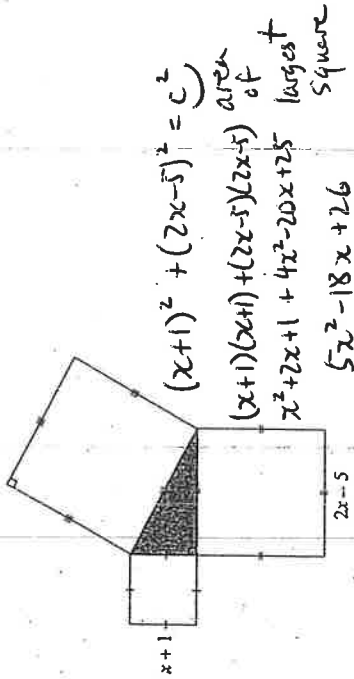
7. Determine a simplified expression for the lateral surface area of the prism below.



Handwritten work for Q7:  
 $2(2x+1)(x+2) + 2(2x-1)(x+2)$   
 $2[2x^2 + 4x + x + 2] + 2[2x^2 + 4x - x - 2]$   
 $2[2x^2 + 5x + 2] + 2[2x^2 + 3x - 2]$   
 $4x^2 + 10x + 4 + 4x^2 + 6x - 4$   
 $8x^2 + 16x$

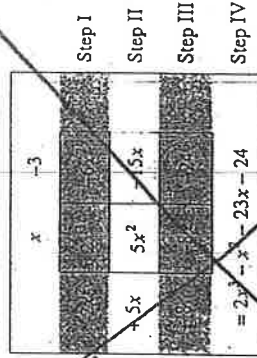
- A.  $8x^2 + 16x$**
- B.  $8x^2 + 20x + 8$
- C.  $16x^2 + 16x - 2$
- D.  $4x^3 + 8x^2 - x - 2$

8. Determine an expression for the area of the largest square in the diagram below.



- A.  $4x^2 + 25$
- B.  $4x^2 - 20x + 25$
- C.  $5x^2 + 26$
- D.  $5x^2 - 18x + 26$**

9. Derek expanded and simplified  $(x-3)(2x^2+5x-8)$  as shown below.



In which step is Derek's first mistake?

- A. Step I
- B. Step II**
- C. Step III
- D. Step IV

10. When  $5x^2 - 20$  is factored, how many factors are in the result?

- A. 2
- B. 3
- C. 4
- D. 5

$5(x^2 - 4)$   
 $5(x+2)(x-2)$

11. One of the factors of  $(3x^2 - 16x + k)$  is  $(x - 7)$ . Determine the value of  $k$ .

- A. -35
- B. -9
- C. 5
- D. 63

the other must begin with  $3x$

$(x-7)(3x+k)$   
 middle terms must add to  $-16$   
 $-21x + ?$  must be  $5x$  so  $+5$   
 $(x-7)(3x+5)$   
 so  $k = -35$

12. When factoring  $x^2 - 7x + 6$  to the form  $(x+a)(x+b)$ , which two of the following characteristics are true?

I.	$ab = -7$	$a + b = 6$	X
II.	$ab = 6$	$a + b = -7$	✓
III.	$a > 0$ and $b > 0$		X
IV.	$a < 0$ and $b < 0$		✓
V.	$a > 0, b < 0$ or $a < 0, b > 0$		X

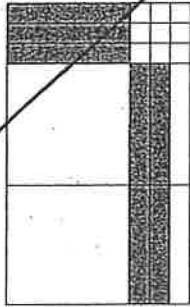
- A. I and III
- B. I and IV
- C. II and IV
- D. II and V

$(x-6)(x-1)$   
 $a = -6$   
 $b = -1$

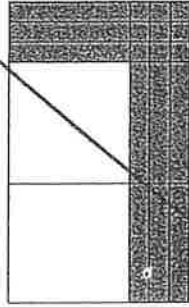
13. Which of the following areas formed by math tiles is factorable?

OMIT

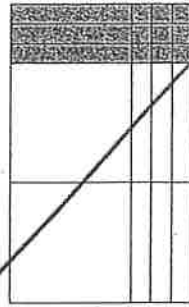
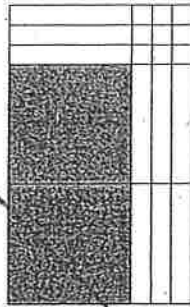
A.



C.



D.



**PART B: NUMERIC-RESPONSE QUESTIONS**

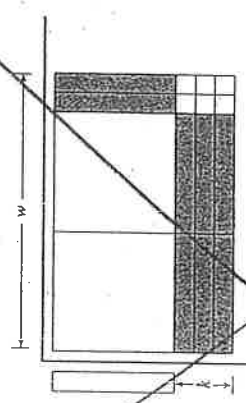
15. Given  $\sqrt{x^{10}} = x^2$ , determine the value of  $n$ . Answer to the nearest integer.

$$x^2 = x^{\frac{10}{n}}$$

$$2 = \frac{10}{n}$$

$$n = 5$$

14. Determine the missing tiles, labelled  $w$ , in the tile model below.



OMIT

- A.
- B.
- C.
- D.

16. When  $(\sqrt[4]{7^9})(\sqrt[3]{7^3})$  is simplified to  $7^n$ , determine the value of  $n$ . Answer to two decimal places.

$$7^{\frac{9}{4}} \left( 7^{\frac{3}{3}} \right)$$

add exponents

$$5^{\frac{9}{4}} + \frac{3^{\times 4}}{5^{\times 4}} = \frac{45}{20} + \frac{12}{20} = \frac{57}{20}$$

$$= 2.85$$

Foundations of Mathematics and Pre-Calculus 10

Sample Items – Algebra and Numbers

Answer Key

Cognitive Processes

N = Knowing

P = Applying

Q = Reasoning

Question Types

= Multiple Choice – no calculator (MN)

= Multiple Choice (MC)

= Numerical Response (NR)

Topics

1. Measurement

2. Algebra and Number

3. Relations and Functions

Prescribed Learning Outcomes (PLOs)

A

B

C

Question Number	Keyed Response	Cognitive Process	Mark	Topic	PLO	Question Type
1.	B	N	1	2	B1	MN
2.	B	N	1	2	B3	MN
3.	A	Q	1	2	B3	MC
4.	C	P	1	2	B1	MC
5.	A	P	1	2	B2	MC
6.	D	P	1	2	B3	MC
7.	A	Q	1	2	B4, A3	MC
8.	D	Q	1	2	B4, A4	MC
<del>9.</del>	<del>C</del>	P	1	2	B4	MC
10.	B	N	1	2	B5	MC
11.	A	Q	1	2	B5	MC
12.	C	Q	1	2	B5	MC
<del>13.</del>	<del>D</del>	P	1	2	B5	MC
<del>14.</del>	<del>B</del>	N	1	2	B5	MC
15.	5	N	1	2	B3	NR
16.	2.85	P	1	2	B3	NR



# PART 3 - RELATIONS + FUNCTIONS

## PART A: MULTIPLE-CHOICE QUESTIONS

1. Determine the x-value of the point of intersection for the system represented by  $f(x) = 3$  and  $g(x) = \frac{5}{2}x + 1$ .
- A. 0.8  
 B. 1.6  
 C. 5  
 D. 8
- $3 = \frac{5x}{2} + 1$   
 $2 = \frac{5x}{2}$   
 $4 = 5x$   
 $\frac{4}{5} = x$   
 $0.8 = x$

2. In which quadrant does the following system contain a solution?
- A.  $y = 2x + 1$   
 B.  $y - 1 = \frac{1}{2}(x - 2)$
- $(2x + 1) - 1 = \frac{1}{2}x - 1$   
 $2x = \frac{1}{2}x - 1$   
 $\frac{3}{2}x = -1$   
 $x = -\frac{2}{3}$
- C.  $y = 2(\frac{-2}{3}) + 1$   
 $y = \frac{-4}{3} + 1$   
 $y = -\frac{1}{3}$   
 $(-\frac{2}{3}, -\frac{1}{3})$

3. Determine the solution to the following linear system:
- A. (5, -5)  
 B. (5, -2.5)  
 C. There is no solution.  
 D. There are infinite solutions.
- $y = -2x + 5$   
 $4x + 2y - 15 = 0$   
 $4x + 2(-2x + 5) - 15 = 0$   
 $4x - 4x + 10 - 15 = 0$   
 $-5 = 0$   
 no solutions

4. Which of the following relations is not a function?

A.

B.

C.

D.

Handwritten notes for question 4:  
 A. NOT a function  
 because 7 has 2 arrows pointing to 5 and 9.

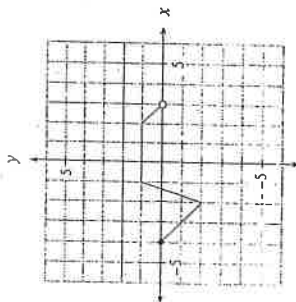
5. The altitude of a plane is a function of the time since takeoff. Identify the dependent variable.

- A. time  
 B. speed  
 C. altitude  
 D. acceleration

Another way to say this is:

the altitude of a plane depends on the time since takeoff.  
 Thus, altitude depends on time  
 so altitude is the dependent variable

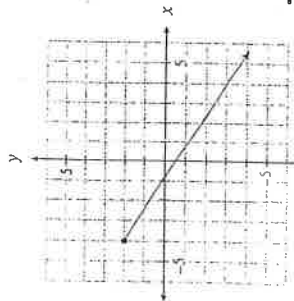
6. Determine the domain of the following relation.



$[-4, 3]$

- A.  $(-4, 3)$
- B.  $[-4, 3]$
- C.  $(-4, 3]$
- D.  $[-4, 3)$

7. Determine the range of the following relation.



$y \leq 2$

or

$-\infty, 2]$

↑  
can be rounded or square

- A.  $(-\infty, \infty)$
- B.  $(-\infty, 2]$
- C.  $[-4, \infty)$
- D.  $(2, \infty)$

8. A bag of caramel candies has a total mass of 180 g, excluding the mass of the bag. Each candy has a mass of 6 g. As a candy is taken out of the bag and eaten, the mass of the remaining candies is plotted versus how many candies are left in the bag. Determine the range for this relation.

- A.  $\{0, 1, 2, 3, \dots, 30\}$
- B.  $\{0, 6, 12, \dots, 180\}$
- C.  $\{0, 1, 2, 3, 4, 5, 6\}$
- D. all real numbers

discrete data by sixes.

9. Determine the equation of the line that passes through  $A(6, 0)$  and is perpendicular to the line formed by  $B(-4, 9)$  and  $C(-7, 10)$ .

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{y - y_1}{x - x_1}$  slope BC =  $\frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 9}{-7 - (-4)} = \frac{1}{-3}$

- A.  $y = 3x - 18$
- B.  $y = 3x + 18$
- C.  $y = \frac{1}{3}x + 2$
- D.  $y = \frac{1}{3}x - 2$

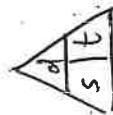
slope is 3  
 $y = 3x + b$  (6, 0) sub in  
 $0 = 3(6) + b$   
 $b = -18$

10. A boat took 3 hours to travel 24 km with the current. On the return trip, the boat took 5 hours to travel 24 km against the current. Determine the speed of the current.

- A. 1.6 km/h
- B. 4 km/h
- C. 6.4 km/h
- D. 24 km/h

$s = \frac{d}{t}$	d	s	t	eqn
with	24 km	$x + y$	3	$x + y = \frac{24}{3} = 8$
against	24 km	$x - y$	5	$x - y = \frac{24}{5}$

Let  $x$  = speed of boat in still water  
 Let  $y$  = speed of current



$x + y = 8$   
 $x - y = \frac{24}{5}$   
 $2y = \frac{24}{5} - 8$   
 $y = \frac{\frac{24}{5} - 40}{2} = \frac{\frac{24 - 200}{5}}{2} = \frac{-176}{10} = -17.6$

PART B: NUMERIC-RESPONSE QUESTIONS

11. Two acid solutions are to be mixed together.
- Solution A is 30% acid by volume.
  - Solution B is 70% acid by volume.

How much of solution A is needed to mix with solution B to make an 800 mL mixture that is 54% acid by volume? Answer to the nearest millilitre.

Let  $x$  = Volume of Solution A  
 let  $y$  = volume of solution B

$$\textcircled{1} x + y = 800 \Rightarrow x = 800 - y$$

$$\textcircled{2} 0.3x + 0.7y = 0.54(800)$$

$$0.3(800 - y) + 0.7y = 432$$

$$240 - 0.3y + 0.7y = 432$$

$$240 + 0.4y = 432$$

$$-240 \quad -240$$

$$\frac{0.4y}{0.4} = \frac{192}{0.4}$$

$$y = 480 \text{ mL}$$

$$x + y = 800$$

$$x + 480 = 800$$

$$x = 320 \text{ mL}$$

$$\text{Solution A} = 320 \text{ mL}$$

$$\text{Solution B} = 480 \text{ mL}$$

Foundations of Mathematics and Pre-Calculus 10

Sample Items — **Relations and Functions**

Answer Key

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**Topics**

1. Measurement

2. Algebra and Number

3. Relations and Functions

**Prescribed Learning Outcomes (PLOs)**

A

B

C

Question Number	Keyed Response	Cognitive Process	Mark	Topic	PLO	Question Type
1.	A	N	1	3	C8	MN
2.	C	P	1	3	C9	MN
3.	C	P	1	3	C9	MC
4.	A	N	1	3	C2	MC
5.	C	P	1	3	C4	MC
6.	B	N	1	3	C1	MC
7.	B	N	1	3	C5	MC
8.	B	P	1	3	C5	MC
9.	A	P	1	3	C7	MC
10.	A	Q	1	3	C9	MC
11.	320	Q	1	3	C9	NR