

## Math 30-2 Review Questions

(Taken from Assessment Standards and Exemplars)

Three rows of a pattern are shown below.

**Row 1**      $1 \times 8 + 1 = 9$

**Row 2**      $12 \times 8 + 2 = 98$

**Row 3**      $123 \times 8 + 3 = 987$

1. The 5th row of the pattern will be:

**A.**     $1\ 234 \times 8 + 4 = 9876$

**B.**     $1\ 234 \times 8 + 5 = 9876$

**C.**     $12\ 345 \times 8 + 4 = 9876$

**D.**     $12\ 345 \times 8 + 5 = 98765$

2. If the number 8 in the pattern above is replaced by the number 9 as shown below, describe a pattern that could be used to calculate the value of row 7.

**Row 1**      $1 \times 9 + 1 = \underline{\hspace{2cm}}$

**Row 2**      $12 \times 9 + 2 = \underline{\hspace{2cm}}$

**Row 3**      $123 \times 9 + 3 = \underline{\hspace{2cm}}$

Use the following information to answer the next question.

The intention of a particular two-player game is to create a line of four adjacent squares using the same letter. To play, each player takes turns placing their first initial somewhere on a six-by-six grid. Margaret and Gerda have started playing this game, as shown on the grid below.

		Column					
		1	2	3	4	5	6
Row	1	G					
	2		G				
	3			G	G		
	4			M	M	G	
	5		M				
	6	M	M	G			

### NUMERICAL RESPONSE:

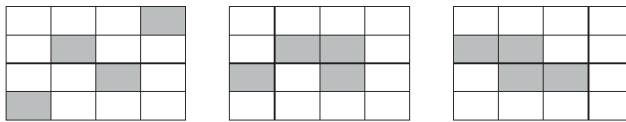
3. It is Margaret's turn, and she determines that she can guarantee a win by placing the letter "M" in:

row: \_\_\_\_\_

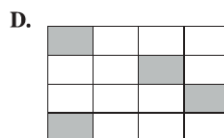
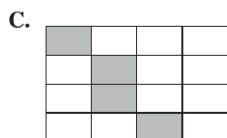
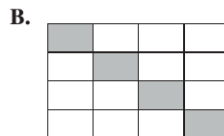
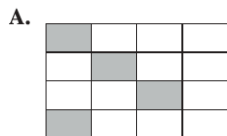
column: \_\_\_\_\_

Use the following information to answer the next question.

A pattern of pictures is shown below. The first picture is the original. In each subsequent picture, each shaded square has stayed in the same place **or** moved to a square horizontally, vertically, or diagonally adjacent to its previous location. The shaded square undergoes the same movement in each subsequent step.



4. Which of the following pictures is next on the pattern?



**NUMERICAL RESPONSE:**

*Use the following information to answer the next question.*

A student makes the following statement.

“VOTE compares to VETO as the number 8570 compares to the number \_\_\_\_\_.”

5. The 4 digit number that completes the statement above is: \_\_\_\_\_.

*Use the following information to answer the next four questions.*

Students in a particular high school were surveyed to determine the subjects in which they were currently enrolled. The table below represents the data that was collected.

<b>Courses Enrolled In</b>	<b>Number of Students</b>
Math only	28
Art only	33
Math and Art	17
Neither course	20

6. The number of students in the Universal set is:

- a) 61                      b) 64                      c) 78                      d) 98

**NUMERICAL RESPONSE:**

7. The # of students taking Art is \_\_\_\_\_.

**NUMERICAL RESPONSE:**

8. The # of students NOT taking Math is \_\_\_\_\_.

9. The # of students taking Math or Art is:

- a) 17                      b) 61                      c) 78                      d) 98

10. Which of the following rows includes two groups that would be an example of disjoint sets?

	<b>Group 1</b>	<b>Group 2</b>
A.	People who regularly drink coffee	People who regularly drink tea
B.	People who have a home phone line	People who have a cellular phone line
C.	The set of all prime numbers	The set of all even numbers
D.	The set of all multiples of 5	The set of all factors of 24

*Use the following information to answer the next two questions.*

**Two Sets**

$A = \{\text{prime numbers less than } 20\}$

$B = \{\text{factors of } 20\}$

11. The union of sets "A" and "B" is

- A. {2, 5}
- B. {2, 4, 5, 10}
- C. {1, 2, 3, 4, 5, 7, 10, 11, 13, 17, 19, 20}
- D. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

12. The set is  $C = A \cap B$  is

- A. {2,5}
- B. {2,4,5,10}
- C. {1,2,3,4,5,7,10,11,13,17,19,20}
- D. {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20}

Use the following information to answer the next two questions.

**Three Sets**

$R = \{\text{natural numbers less than } 50\}$

$S = \{\text{even numbers}\}$

$T = \{10, 20, 30, 40\}$

13.(SE) Which of the following statements is true for sets R,S and T?

**A.**  $R \subset S$

**B.**  $R \subset T$

**C.**  $S \subset R$

**D.**  $T \subset R$

14.(SE) Which of the following statements is NOT true for sets R,S and T?

**A.**  $T \subset (R \cap S)$

**B.**  $T \subset (R \cap T)$

**C.**  $(R \cap S) \subset T$

**D.**  $(R \cap T) \subset T$

15.

The odds in favour of the Renegades winning the season final in the football league are listed as 10:7. The odds against the Renegades winning the season final are

**A.** 3:7

**B.** 3:10

**C.** 7:10

**D.** 10:3

**16. (SE) NUMERICAL RESPONSE:**

Statistics show that 6 out of 25 car accidents are weather-related. The odds that a car accident is weather-related can be expressed in the form  $a:b$ . The values of  $a$  and  $b$  are, respectively, \_\_\_\_\_ and \_\_\_\_\_.

A particular traffic light at the outskirts of a town is red for 30 s, green for 25 s, and yellow for 5 s in every minute. When a vehicle approaches the traffic light, the probability that the light will be red or yellow is

17.

A.  $7/12$

B.  $1/2$

C.  $1/12$

D.  $1/24$

*Use the following information to answer the next question.*

Malaga, Spain, lies in a region of Europe known as the Costa Del Sol (Coast of the Sun). The probability of sunshine on any given day in the region is approximately 0.89.

**18 (SE) NUMERICAL RESPONSE:**

In a non-leap year of 365 days, the average number of days of the year that a tourist could expect to experience weather other than sunshine, to the nearest whole number, is \_\_\_\_\_ days.

Use the following information to answer the next question.

Some possible events for rolling a regular six-sided die are listed below.

- 1 An even number
- 2 A number less than 3
- 3 A number that is a multiple of 3
- 4 A number that is greater than or equal to 2

**NUMERICAL RESPONSE:**

19. From the list above, the 2 events that are mutually exclusive are \_\_\_ and \_\_\_ (order from least to greatest):

20.

Based on previous performance, the probability of a particular baseball team winning any game is  $\frac{4}{5}$ . The probability that this team will win their next 2 games is

- A.  $\frac{1}{5}$
- B.  $\frac{4}{5}$
- C.  $\frac{1}{25}$
- D.  $\frac{16}{25}$

Use the following information to answer the next question.

A student is classifying the following contexts that require the use of either permutations or combinations.

- Context A** Dialing a 10-digit telephone number with distinct digits  
**Context B** Choosing 5 people for a committee  
**Context C** Selecting 4 fruits to put in a salad  
**Context D** Opening a lock with a 3-number combination

## NUMERICAL RESPONSE:

21.

For each context, use a 1 to indicate if it should be solved using a **permutation** and use a 2 to indicate if it should be solved using a **combination**.

Context A would be solved using a \_\_\_\_\_ (Record in the **first** column)

Context B would be solved using a \_\_\_\_\_ (Record in the **second** column)

Context C would be solved using a \_\_\_\_\_ (Record in the **third** column)

Context D would be solved using a \_\_\_\_\_ (Record in the **fourth** column)

22. (SE)

A school committee consists of 1 vice-principal, 2 teachers, and 3 students. The number of different committees that can be selected from 2 vice-principals, 5 teachers, and 9 students is

- A. 20 160
- B. 8 008
- C. 1 680
- D. 90

## NUMERICAL RESPONSE:

23.

Use the following information to answer the next question.

A committee of 3 girls and 2 boys is to be chosen from a group of 9 girls and 7 boys. The total number of different committees that can be formed can be expressed in the form

$${}_w C_x \cdot {}_y C_z$$

where  ${}_w C_x$  represents the number of possible choices of girls for the committee and  ${}_y C_z$  represents the number of possible choices of boys for the committee.

The values of w,x,y, and z respectively are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.



24.

An expression that is equivalent to  $\frac{x^2 + x}{x}$ ,  $x \neq 0$ , is

- A.  $x + 1$ ,  $x \neq 0$
- B.  $x^2 + 1$ ,  $x \neq 0$
- C.  $2x$ ,  $x \neq 0$
- D.  $x^2$ ,  $x \neq 0$

**NUMERICAL RESPONSE:**

25.

The non-permissible value of  $\frac{2x + 1}{3x - 9}$  is \_\_\_\_\_

26.

When the rational expression  $\frac{2x + 4}{x^2 - 4}$  is simplified, the equivalent expression is

- A.  $\frac{2}{x - 2}$ ,  $x \neq -2, 2$
- B.  $\frac{2}{x + 2}$ ,  $x \neq -2$
- C.  $\frac{2}{x}$ ,  $x \neq -2, 0, 2$ ,
- D.  $\frac{2}{x}$ ,  $x \neq 0$

Use the following information to answer the next question.

The expression  $\frac{ab}{c}$  can be simplified to  $\frac{x+4}{x+3}$ ,  $x \neq -3, 3$ . Henry knows that one expression can be selected from each of the columns below to form a correct simplification.

Possibilities for $a$	Code	Possibilities for $b$	Code	Possibilities for $c$	Code
$(x-3)$	1	$(2x+8)$	4	$(3x^2-27)$	7
$(2x-6)$	2	$(x+4)$	5	$(2x^2-18)$	8
$(3x-9)$	3	$\frac{1}{2}(x+4)$	6	$(x^2-9)$	9

### NUMERICAL RESPONSE:

27.

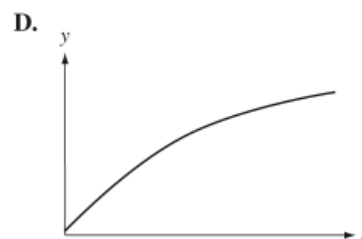
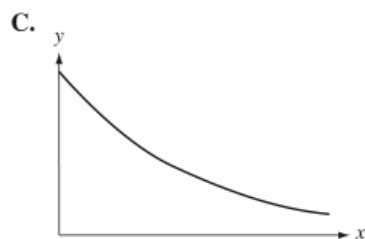
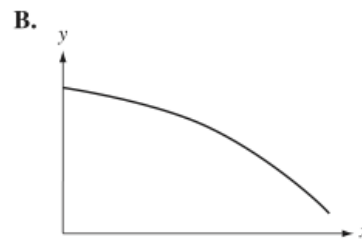
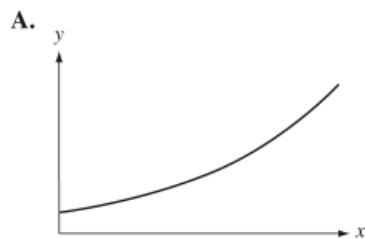
One possible selection to form a correct simplification is  $(x-3)$ ,  $(x+4)$ , and  $(x^2-9)$ , so Henry records the code 159. To form another correct simplification, a code for another possibility for

$a$  is \_\_\_\_\_ (Record in the **first** column)

$b$  is \_\_\_\_\_ (Record in the **second** column)

$c$  is \_\_\_\_\_ (Record in the **third** column)

28. A painting was purchased in 2010 for \$10,000. If the painting appreciates in value at 5%/a then which of the following graphs best models the appreciated value of this painting for the next 40 years?



29. , the

*Use the following information to answer the next question.*

The pH of a solution can be determined using the formula

$$\text{pH} = -\log_{10}(C)$$

where  $C$  is the concentration of hydrogen ions in the solution. The pH of a particular solution is 6.6.

**NUMERICAL RESPONSE:**

30. To the nearest tenth, if the concentration of hydrogen ions in the solution is doubled, the new pH of the solution will be \_\_\_\_\_.

*Use the following information to answer the next two questions.*

A 15-gallon tank is being filled with water and has a pump that will cause it to drain when the amount of water inside the tank hits a certain volume. The volume of water in the tank over a 3-hour period can be modelled by the function

$$y = -2t^2 + 5t + 6$$

where  $y$  represents the volume of water in the tank in gallons and  $t$  represents the time in hours after noon on a particular day.

31.

To determine the volume of water in the tank at noon, the characteristic of the function that should be analyzed is the

- A.  $y$ -intercept
- B. positive  $t$ -intercept
- C.  $t$ -coordinate of the vertex
- D.  $y$ -coordinate of the vertex

**NUMERICAL RESPONSE:**

32. The maximum volume of liquid in the tank, to the nearest tenth of a gallon, is \_\_\_\_\_ gallons.

Use the following information to answer the next question.

The rate at which snow fell on a driveway on a particular day can be modelled by

$$y = -3x^2 + 6x$$

where  $y$  represents the rate of snowfall in  $\text{ft}^3/\text{hr}$ , and  $x$  represents the time in hours after midnight.

33.

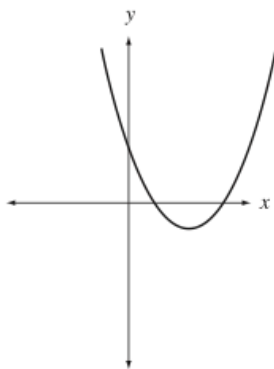
To estimate the length of time that snow fell on this particular day, a student should determine the

- A.  $y$ -intercept
- B.  $x$ -coordinate of the vertex
- C.  $y$ -coordinate of the vertex
- D. difference between the  $x$ -intercepts

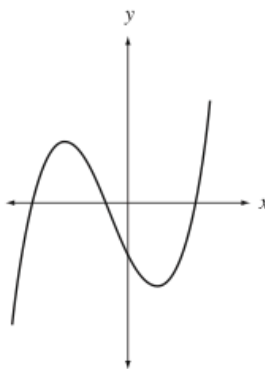
34.

Which of the following graphs would **most likely** represent the graph of a cubic function?

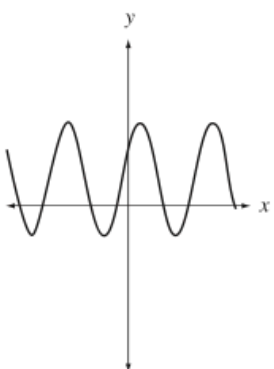
A.



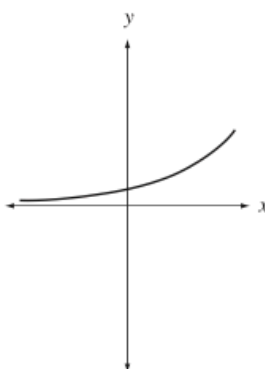
\*B.



C.



D.



Use the following information to answer the next question.

A juice box measures  $5.0 \text{ cm} \times 4.0 \text{ cm} \times 12.0 \text{ cm}$  and contains 240 mL of juice. The manufacturer wants to design a larger box by increasing each dimension of the juice box by the same amount.

The volume of the larger box can be modelled by the function

$$V = (5 + x)(4 + x)(12 + x)$$

where  $V$  represents the volume, in mL, and  $x$  represents the increase in the length of each dimension, in cm.

**Note:**  $1 \text{ cm}^3 = 1 \text{ mL}$

**NUMERICAL RESPONSE:**

35.

If the larger box must hold a maximum of 1 000 mL of juice, the amount,  $x$ , by which each dimension of the juice box must be increased, to the nearest tenth of a centimetre, is \_\_\_\_\_ cm.

Use the following information to answer the next question.

The height of a pendulum,  $h$ , in inches, above a table top  $t$  seconds after the pendulum is released can be modelled by the sinusoidal regression function

$$h = 2 \sin(3.14t - 1) + 5$$

**NUMERICAL RESPONSE:**

36.

To the nearest tenth of an inch, the height of the pendulum at the moment of release is \_\_\_\_\_ in.

Use the following information to answer the next two questions.

The height of a rider on a Ferris wheel can be modelled by the sinusoidal regression function

$$h = 6 \sin(1.05t - 1.57) + 8$$

where  $h$  is the height of the rider above the ground, in metres, and  $t$  is the time in minutes after the ride starts.

37.

According to the sinusoidal regression function, the maximum height of the rider above the ground is

- A. 2 m
- B. 6 m
- C. 8 m
- D. 14 m

**NUMERICAL RESPONSE:**

38.

When the rider is at least 11.5 m above the ground, she can see the rodeo grounds. During each rotation of the Ferris wheel, the length of time that the rider can see the rodeo grounds, to the nearest tenth of a minute, is \_\_\_\_\_ min.

## Mathematics 30–2 Formula Sheet

### Relations and Functions

*Graphing Calculator Window Format*

$$x: [x_{\min}, x_{\max}, x_{\text{scl}}]$$

$$y: [y_{\min}, y_{\max}, y_{\text{scl}}]$$

*Exponents and Logarithms*

$$y = a^x \leftrightarrow x = \log_a y$$

$$\log_b c = \frac{\log_a c}{\log_a b}$$

*Laws of Logarithms*

$$\log_a (M \cdot N) = \log_a M + \log_a N$$

$$\log_a \left( \frac{M}{N} \right) = \log_a M - \log_a N$$

$$\log_a (M^n) = n \log_a M$$

*Exponential functions*

$$y = a \cdot b^x$$

*Sinusoidal functions*

$$y = a \cdot \sin(bx + c) + d$$

$$\text{Period} = \frac{2\pi}{b}$$

*Quadratic equations*

$$\text{For } ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

### Probability

$$n! = n(n-1)(n-2)\dots 3 \cdot 2 \cdot 1,$$

where  $n \in N$  and  $0! = 1$

$${}_n P_r = \frac{n!}{(n-r)!}$$

$${}_n C_r = \frac{n!}{(n-r)!r!}$$

$${}_n C_r = \binom{n}{r}$$

$$P(A \cup B) = P(A) + P(B)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cap B) = P(A) \cdot P(B)$$

$$P(A \cap B) = P(A) \cdot P(B | A)$$

### Logical Reasoning

$A'$  Complement

$\emptyset$  Empty set

$\cap$  Intersection

$\subset$  Subset

$\cup$  Union