Maine Through Year Assessment

Item Type Sampler
Mathematics
Grade 8

Student's Name:

Directions:

On the following pages of your booklet are questions for the Grade 8 *Maine Through Year Assessment Mathematics* Item Type Sampler.

Read these directions carefully before beginning this item type sampler.

This item type sampler will include several different types of questions. Multiple Choice questions will ask you to select a single answer. Multiple Select questions will ask you to select multiple correct answers from among five or more answer choices. For some questions, there may be two parts, Part A and Part B, where each part has a Multiple Choice or Multiple Select question.

For all questions:

- Read each question carefully and choose the best answer.
- You may use scratch paper to solve the problems.
- The Mathematics Reference Sheet is provided in the back of the Mathematics section. You may refer to this page at any time during the sampler.
- You may use a calculator ONLY for questions 1–5. You may NOT use a calculator for any other questions on this sampler.
- Be sure to answer ALL the questions.

When you come to the word STOP at the end of Part 1, you have finished Part 1 of the Grade 8 Mathematics Item Type Sampler. You may review ONLY Part 1 to check your answers. Your calculator must be collected before you can continue with Part 2. When your calculator has been collected, and your proctor has given you permission, you may move on to Part 2.

When you are finished with Part 2, you may review ONLY Part 2 to check your answers.

STOP.

1. The shortest sides of right triangle PTW have lengths of 20 units and 21 units. What is the perimeter, in units, of triangle PTW?

   A. 47

   B. 50

   C. 63

   D. 70

2. The equation $y = -0.26x + 29$ can be used to approximate y, the total amount of snow, in inches, that fell in Maine during season x. A student evaluated the equation at $x = 10$ and determined that $y = 26.4$. The student concluded that exactly 26.4 inches of snow fell in Maine during season x.

   Which statement about the student's conclusion is true?

   A. The conclusion is true because the student correctly evaluated the equation.

   B. The conclusion is true because the student correctly used the representations of the variables.

   C. The conclusion is not true because $(10 - 29) \div -0.26 = 73$, so 73 inches of snow fell during season 10.

   D. The conclusion is not true because the equation estimates that approximately 26.4 inches of snow fell during season 10.

3. A student has been recording the amount of money in their bank account each week this year. The function $y = 17.2x + 27.5$ can be used to represent the amount of money in the account, y, at the end of x weeks this year.

   Which statements about the bank account are true? Select **all** that apply.

   A. Each week, the value of the account has increased by $17.20.

   B. Each week, the value of the account has increased by $27.50.

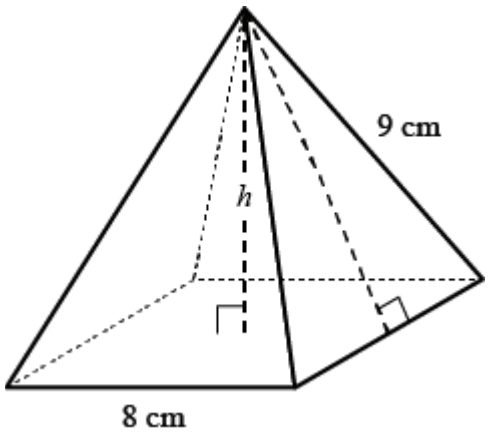
   C. Each week, the value of the account has increased by $44.70.

   D. At the beginning of the year, there was $17.20 in the account.

   E. At the beginning of the year, there was $27.50 in the account.

   F. At the beginning of the year, there was $44.70 in the account.

4. A square pyramid is shown. The square base has a length of 8 centimeters (cm). The edge of a triangular face has a length of 9 cm.



What is the height, *h*, of the square pyramid?

A. $\sqrt{17}$ cm

B. 7 cm

C. $\sqrt{65}$ cm

D. 9 cm

5. A student collected data on all the seventh and eighth grade members of the music club.

   • 10 of the seventh graders were in band.
   • 12 of the seventh graders were in chorus.
   • 11 of the eighth graders were in band.
   • 7 of the eighth graders were in chorus.

   None of the club members were in both band and chorus. Which two-way relative frequency table shows the data for the seventh and eighth grade music club members?

A.

Music Club Members

	Band	Chorus	Total
Seventh Graders	0.25	0.30	0.55
Eighth Graders	0.275	0.175	0.45
Total	0.525	0.475	1.00

B.

Music Club Members

	Band	Chorus	Total
Seventh Graders	0.48	0.63	1.11
Eighth Graders	0.52	0.37	0.89
Total	1.00	1.00	2.00

C.

Music Club Members

	Band	Chorus	Total
Seventh Graders	0.45	0.54	0.99
Eighth Graders	0.61	0.38	0.99
Total	1.06	0.92	1.98

D.

Music Club Members

	Band	Chorus	Total
Seventh Graders	0.25	0.275	0.525
Eighth Graders	0.30	0.175	0.475
Total	0.55	0.45	1.00

STOP.

PAGE INTENTIONALLY
LEFT BLANK
DO NOT WRITE ON THIS PAGE

THIS IS THE END OF THE CALCULATOR SECTION OF THE TEST

You may NOT use a calculator for any other questions on this test.

Raise your hand and notify your Test Administrator or Proctor that you are ready to turn in your calculator.

Once your Proctor has collected your calculator and given you permission, you may go on to the non-calculator section of the test.

STOP.

6. Two proportional relationships, P and Q, are described in these statements.

- In relationship P, the value of *y* increases by 2 as *x* increases by 5.
- In relationship Q, the value of *y* increases by 4 as *x* increases by 1.

Which statement correctly compares P and Q?

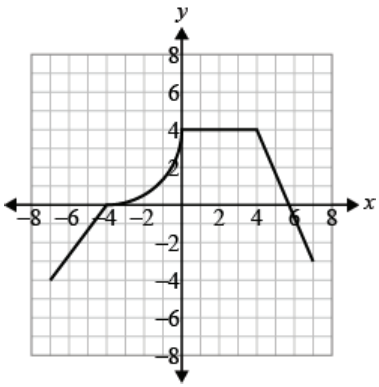
A. The rate of change of P is less than the rate of change of Q.

B. The rate of change of P is greater than the rate of change of Q.

C. The *y*-coordinate of the *y*-intercept of P is less than the *y*-coordinate of the *y*-intercept of Q.

D. The *y*-coordinate of the *y*-intercept of P is greater than the *y*-coordinate of the *y*-intercept of Q.

7. **Use the graph to answer the question.**



The graph of a function is shown. For which values of *x* is the graph nonlinear?

A. from $x = -7$ to $x = -4$

B. from $x = -4$ to $x = 0$

C. from $x = 0$ to $x = 4$

D. from $x = 4$ to $x = 7$

8. A student is solving the equation $3x = 3x + 1$. Subtracting $3x$ from both sides results in the equation $0 = 1$.

   Which statement is true?

   A. Because $0 = 1$ is true, there is 1 solution to the original equation.

   B. Because $0 = 1$ is false, there is no value of x that makes the original equation true.

   C. Because $0 = 1$ has 1 on the right side of the equation, there is 1 solution to the original equation.

   D. Because $0 = 1$ has 0 on the left side of the equation, there is no solution to the original equation.

9. Which fraction is equivalent to $0.\overline{45}$?

   A. $\frac{4}{5}$

   B. $\frac{5}{11}$

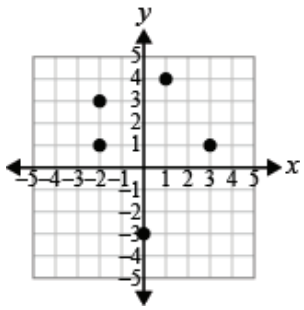
   C. $\frac{9}{20}$

   D. $\frac{454}{999}$

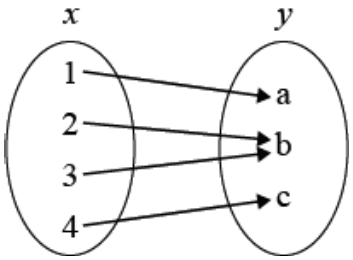
10. **Part A**

Which relations are functions? Select **all** that apply.

A.



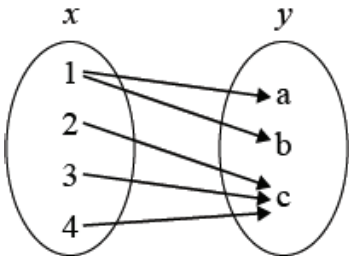
B.



C.

x	−2	−1	0	1	2
y	5	4	0	4	5

D.



E.

x	−2	−2	0	1	3
y	1	3	−3	4	1

Part B

Given the set of ordered pairs {(1, –3), (5, 6), (0, –2), (0, 5), (3, 6)}, which statement is true?

A. The set of ordered pairs represents a function because all five ordered pairs are different.

B. The set of ordered pairs represents a function because every *x*-value is assigned to one unique *y*-value.

C. The set of ordered pairs does not represent a function because the *y*-value of 6 is assigned to two different *x*-values.

D. The set of ordered pairs does not represent a function because the *x*-value of 0 is assigned to two different *y*-values.

11. Which expression is equivalent to $3^4 \times \left(\frac{2}{3}\right)^2 \div \left(\frac{2}{3}\right)^3$?

    A. $\frac{2^5}{3}$

    B. $\frac{3^4}{2}$

    C. $\frac{3^5}{2}$

    D. $\frac{3^6}{2}$

12. In right triangle XYZ, angle X is a right angle, and the measure of angle Y is 25°. What is the measure of angle Z?

    A. 65°

    B. 75°

    C. 115°

    D. 155°

13. Which equations have exactly one solution? Select **all** that apply.

    A. $x + 2 = 2$

    B. $0x + 5 = 2$

    C. $0x + 5 = 5$

    D. $2x + 2 = 5$

    E. $2x + 5 = 5$

14. Between which two numbers is the value of $\sqrt{8.25}$?

A. 2 and 3

B. 4 and 5

C. 8 and 9

D. 16 and 17

15. Relation R is represented in the table of corresponding values of *x* and *y*.

x	***y***
1	3
5	4
2	7
1	2
4	5

Which statement about whether relation R is a function of *x* is true?

A. R is a function of *x* because each value of *y* relates to exactly one value of *x*.

B. R is a function of *x* because 2, 4, and 5 are among the listed values of *x* and *y*.

C. R is not a function of *x* because 2, 4, and 5 are among the listed values of *x* and *y*.

D. R is not a function of *x* because each value of *x* does not relate to exactly one value of *y*.

Maine Department of Education

Mathematics Reference Sheet

Perimeter

The perimeter of a polygon is equal to the sum of the lengths of its sides.

Circumference of a Circle

$C = \pi d$ or $C = 2\pi r$

$\pi \approx 3.14$

Area

Triangle	$A = \frac{1}{2}bh$
Rectangle	$A = bh$ or $A = lw$
Circle	$A = \pi r^2$

Surface Area

The total area of the 2-dimensional surfaces that make up a 3-dimensional object.

Volume

Right Rectangular Prism	$V = lwh$ or $V = Bh$
Right Prism	$V = Bh$
Cylinder	$V = \pi r^2 h$
Cone	$V = \frac{1}{3}\pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Pyramid	$V = \frac{1}{3}Bh$

Slope Formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Linear Equation

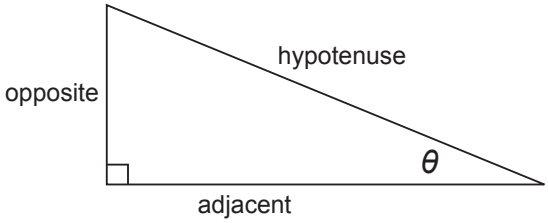
$y = mx + b$

Pythagorean Theorem

$a^2 + b^2 = c^2$

Definition of Trigonometric Functions

For $0° < \theta < 90°$,



$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

Mean

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n}$$

Interquartile Range

$IQR = Q_3 - Q_1$

The difference between the third quartile and first quartile of a set of data.

Standard Deviation

$$\sigma = \sqrt{\frac{\left(x_1 - \bar{x}\right)^2 + \left(x_2 - \bar{x}\right)^2 + \ldots + \left(x_n - \bar{x}\right)^2}{n}}$$

Item Type Sampler Grade 8