2021-2022

NSCAS NEBRASKA STUDENT-CENTERED ASSESSMENT SYSTEM

Grade 8 - Item Type Sampler
Mathematics

Directions:

On the following pages of your booklet are questions for the Grade 8 *Nebraska Student-Centered Assessment System Mathematics (NSCAS-M)* 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 an answer from among four choices. Multiple select questions will ask you to select multiple correct answers from among five or more 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. These questions will be found in your item type sampler.

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 NSCAS Growth 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.

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Mathematics Reference Sheet

Shape	Area	Circumference
Circle	$A = \pi r^2$	$C = \pi d = 2\pi r$
Triangle	$A = \frac{1}{2}bh$	**Perimeter**
Rectangle	$A = l \times w$	$P = 2l + 2w = 2(l + w)$
Square	$A = s \times s$	$P = s + s + s + s$
Trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$	
Parallelogram	$A = bh$	

Key	
b = base	l = length
h = height	w = width
B = area of base	s = side length
H = height of triangular prism	
s_1, s_2, s_3 are the lengths of each side of the triangular base	
d = diameter	r = radius
Use 3.14 for π.	

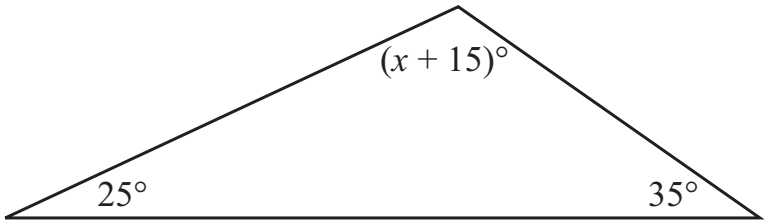
3 – Dimensional Shape	Volume	Surface Area
Rectangular Prism	$V = lwh = Bh$	$SA = 2lw + 2lh + 2wh = 2B + 2lh + 2wh$
Triangular Prism	$V = \frac{1}{2}lwh = Bh$	$SA = bh + (s_1 + s_2 + s_3)H = 2B + (s_1 + s_2 + s_3)H$
Cone	$V = \frac{1}{3}\pi r^2 h$	
Cylinder	$V = \pi r^2 h$	
Sphere	$V = \frac{4}{3}\pi r^3$	

Percent Change
$\%\ \text{change} = \frac{\text{difference in amount}}{\text{original amount}}$

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

Standard Units	Metric Units
Conversions – Length	
1 foot (ft) = 12 inches (in.)	1 centimeter (cm) = 10 millimeters (mm)
1 yard (yd) = 3 feet (ft) = 36 inches (in.)	1 meter (m) = 100 centimeters (cm)
1 mile (mi) = 1,760 yards (yd) = 5,280 feet (ft)	1 meter (m) = 1,000 millimeters (mm)
	1 kilometer (km) = 1,000 meters (m)
Conversions – Volume	
1 cup = 8 fluid ounces (fl oz)	1 liter (l) = 1,000 milliliters (ml)
1 pint (pt) = 2 cups	1 liter (l) = 1,000 cubic centimeters (cu. cm)
1 quart (qt) = 2 pints (pt)	
1 gallon (gal.) = 4 quarts (qt)	
Conversions – Weight/Mass	
1 pound (lb) = 16 ounces (oz)	1 gram (g) = 1,000 milligrams (mg)
1 ton = 2,000 pounds (lb)	1 kilogram (kg) = 1,000 grams (g)

1. **Use the diagram below to answer the question.**



What is the value of x in the triangle?

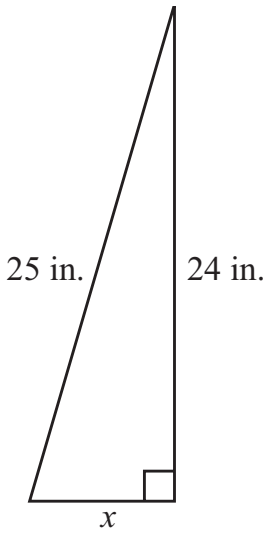
A. 60

B. 75

C. 105

D. 120

2. **Use the figure below to answer the question.**



Using the Pythagorean theorem, what is the value of x ?

A. 1 inch

B. 7 inches

C. 41 inches

D. 49 inches

3. Which inequality represents the solution to $3x + 2 < -4$?

   A. $x < -2$

   B. $x > -2$

   C. $x < -\frac{2}{3}$

   D. $x > -\frac{2}{3}$

4. A company makes storage cylinders that have a height of 10 feet and a diameter of 6 feet.

   Part A

   To the nearest cubic foot, what is the volume of the cylinder?

   A. 188 cubic feet

   B. 283 cubic feet

   C. 1,130 cubic feet

   D. 1,884 cubic feet

   Part B

   The company decides to make another storage cylinder but with twice the volume. Which change to the diameter or height will double the volume of the cylinder?

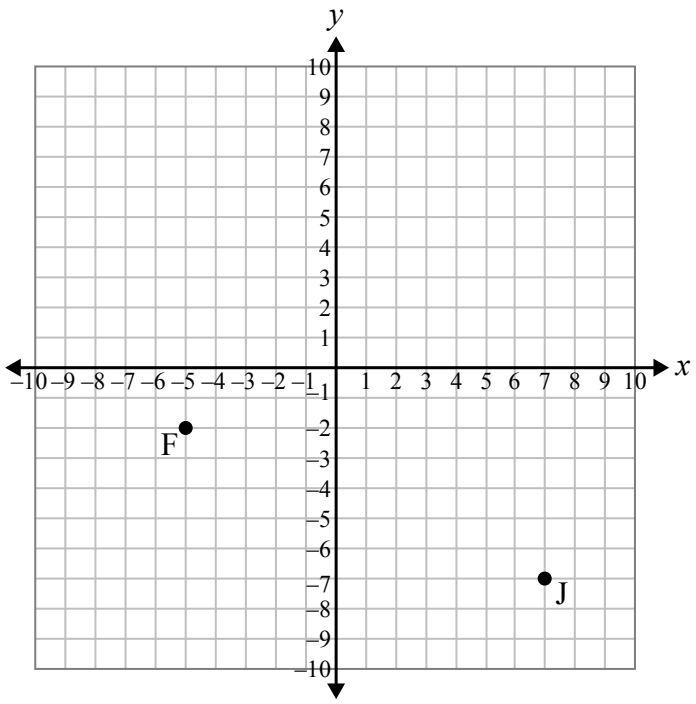
   A. Change the diameter to 12 feet.

   B. Change the diameter to 36 feet.

   C. Change the height to 15 feet.

   D. Change the height to 20 feet.

5. **Use the points on the coordinate plane below to answer the question.**



What is the distance between points F and J?

A. 5

B. 13

C. 17

D. 30

STOP.

6. Which type of number is -2 ?

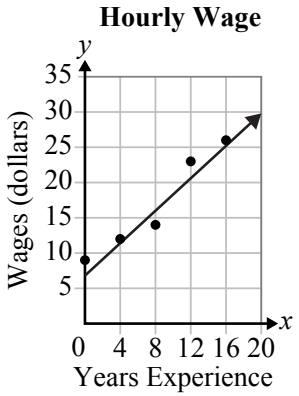
   A. integer

   B. irrational

   C. natural

   D. whole

7. The line shows what people in a particular job can expect to earn based on their years of experience.



   Which statements about the information in the graph are true? Select **all** that apply.

   A. An employee with 4 years of experience can expect to earn approximately $12 per hour.

   B. An employee earning $20 per hour has approximately 11 years of experience.

   C. With 16 years of experience, an employee can expect to earn $30 per hour.

   D. With 20 years of experience, an employee can expect to earn $35 per hour.

   E. An employee can expect a raise of slightly more than $1 per hour each year.

   F. An employee can expect to earn $10 per hour as a starting wage.

8. Aaron sells jackets online. He adds $\$4.75$ per jacket onto every purchase for shipping. He collected a total of $\$188.75$ selling 5 jackets. Which equation could be used to calculate the sale price, j, of each jacket?

   A. $5(j + 4.75) = 188.75$

   B. $5j + 4.75 = 188.75$

   C. $5(4.75) + j = 188.75$

   D. $(5 + 4.75)j = 188.75$

9. What is the value of $|3 + 5| - |4|$?

   A. -12

   B. -4

   C. 4

   D. 12

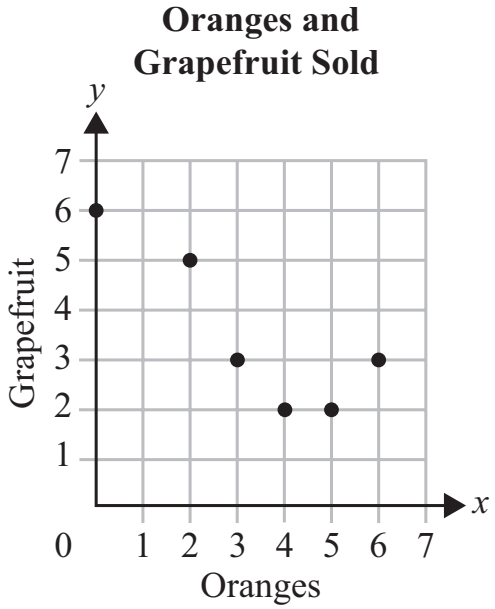
10. **Use the table below to answer the question.**

Oranges and Grapefruit Sold

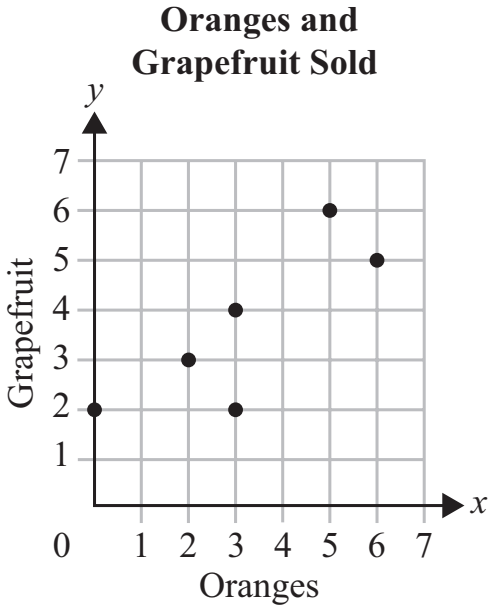
Oranges	3	4	0	2	5	6
Grapefruit	3	2	6	5	2	3

The table shows the numbers of oranges and grapefruits sold to six different customers. Which scatter plot represents the data?

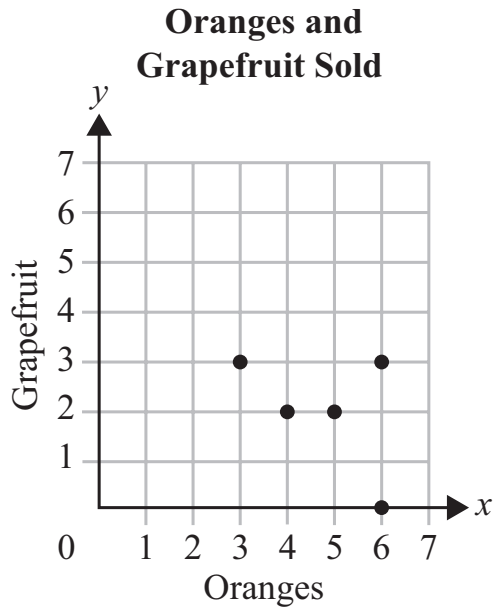
A.



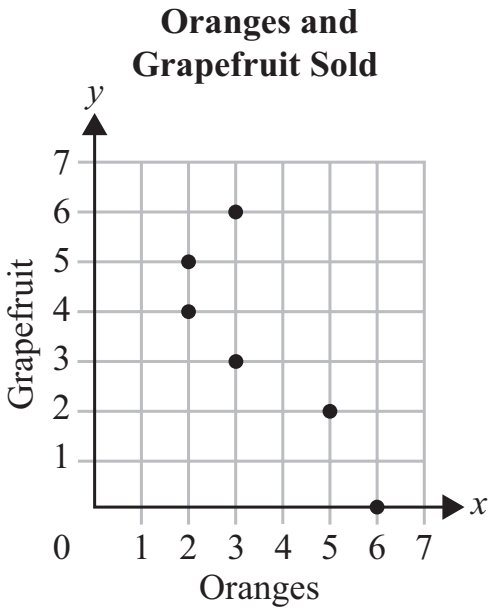
B.



C.



D.



11. **Part A**

Which equation has exactly one solution?

A. $3x + 4 = 5x + 4$

B. $6x + 2 = 6x + 3$

C. $7x + 1 = 2x + 5x + 1$

D. $10x + 6 = 2(5x + 3)$

Part B

Which statements explain why the equation has exactly one solution? Select **all** that apply.

A. The equation simplifies to eliminate the x's and have different constants on both sides of the equation.

B. The equation simplifies to eliminate the x's and have the same constant on both sides of the equation.

C. The equation simplifies to x's on one side of the equation and a constant on the other side.

D. Substituting the number one into the equation makes the equation true.

E. There is only one value for x that makes the equation true.

F. There is only one variable in the equation.

12. What is the square root of 100?

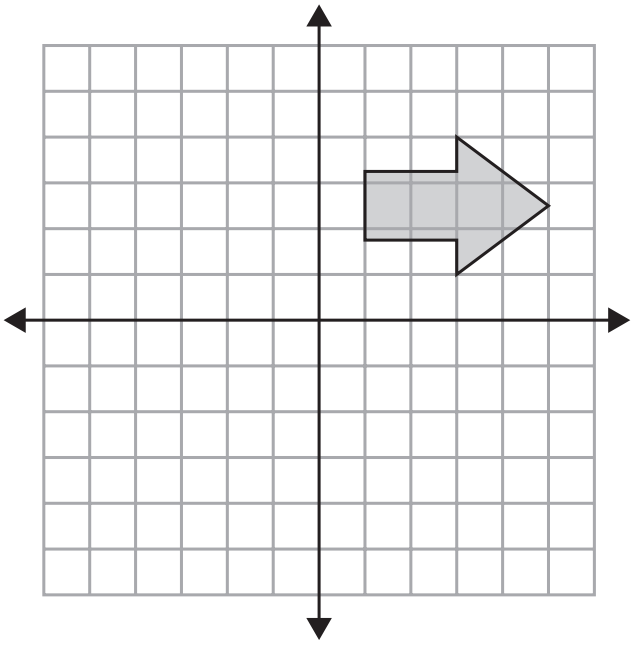
A. 5

B. 10

C. 25

D. 50

13. **Use the arrow on the coordinate plane below to answer the question.**



The arrow is rotated 90° clockwise about the origin. Which statement correctly describes the quadrant and orientation of the arrow?

A. The arrow is in quadrant II pointing right.

B. The arrow is in quadrant II pointing down.

C. The arrow is in quadrant IV pointing right.

D. The arrow is in quadrant IV pointing down.

14. What is 2.15×10^{-4} in standard form?

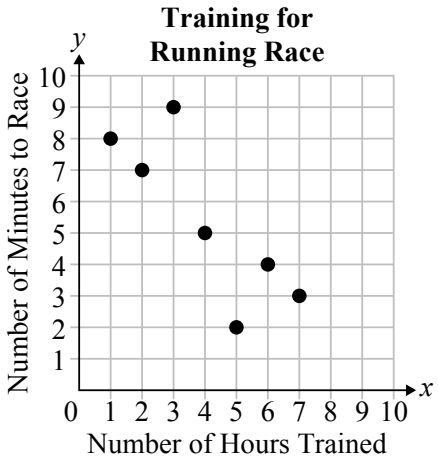
A. $-21{,}500$

B. -0.000215

C. 0.000215

D. $21{,}500$

15. **Use the scatter plot to answer the question.**



Which set of data was used to create the scatter plot?

A.

Hours Trained	Minutes to Complete Race
8	1
7	2
9	3
5	4
2	5
4	6
3	7

B.

Hours Trained	Minutes to Complete Race
2	1
3	2
4	3
5	4
7	5
8	6
9	7

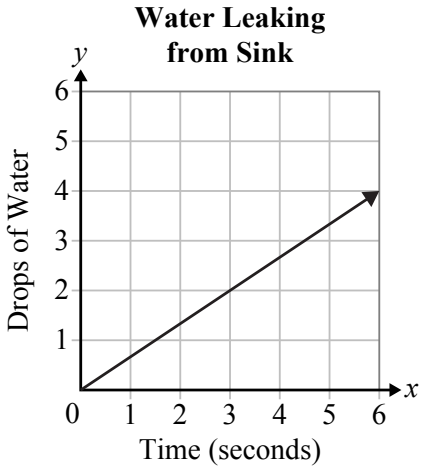
C.

Hours Trained	Minutes to Complete Race
1	8
2	7
3	9
4	5
5	2
6	4
7	3

D.

Hours Trained	Minutes to Complete Race
1	2
2	3
3	4
4	5
5	7
6	8
7	9

16. **Use the graph below to answer the question.**



The graph shows the amount of water leaking from a sink over time. Which statement correctly compares the amount of water the sink leaks and the time?

A. For every 1 second, the sink leaks 2 drops of water.

B. For every 2 seconds, the sink leaks 1 drop of water.

C. For every 2 seconds, the sink leaks 3 drops of water.

D. For every 3 seconds, the sink leaks 2 drops of water.

17. Which expressions are equivalent to $\frac{1}{64}$? Select **all** that apply.

A. -2^6

B. 2^{-6}

C. 4^3

D. 4^{-3}

E. 8^2

F. 8^{-2}

G. $2^{-4} \cdot 2^{-4}$

H. $2^{-8} \cdot 2^8$

18. Jenny has $\$1.65$ in quarters and dimes. She has x quarters and 3 times as many dimes as quarters. Which equation represents this situation?

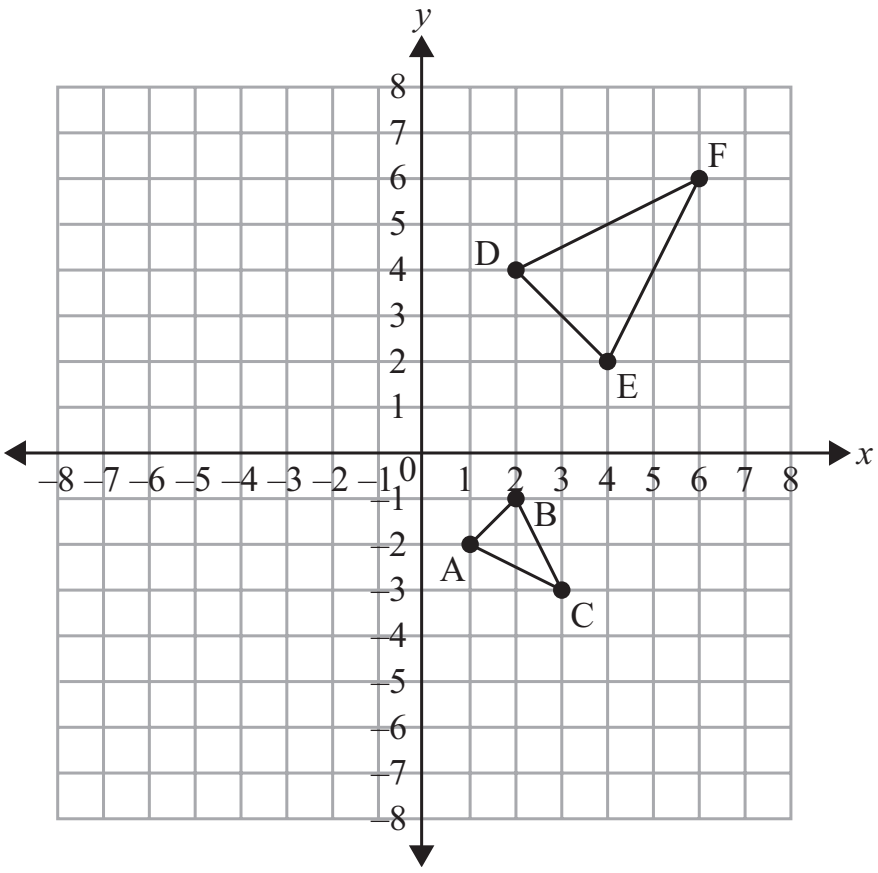
A. $0.10(x) + 0.25(x) = 1.65$

B. $0.10(x) + 0.25(3x) = 1.65$

C. $0.10(3x) + 0.25(x) = 1.65$

D. $0.10(3x) + 0.25(3x) = 1.65$

19. **Use the triangles below to answer the question.**



Triangles ABC and DEF are similar but not congruent. Which set of transformations could be used to transform triangle ABC onto triangle DEF?

A. A translation 3 units up. followed by a rotation 90° counterclockwise about its center.

B. A reflection across the x-axis followed by a dilation of scale factor 2 about the origin.

C. A reflection across the line $y = x$ followed by a rotation 90° clockwise about the origin.

D. A rotation 90° counterclockwise about the origin followed by a dilation of scale factor 0.5 about the origin.

20. Which value of y makes $\frac{4(y-3)}{2} = 9 - y$ true?

A. 3

B. 4

C. 5

D. 6

STOP.

NSCAS Growth Grade 8
Item Type Sampler Answer Key
Mathematics

Sequence	Key	Points
1.	**C**	**1**
2.	**B**	**1**
3.	**A**	**1**
4.	Part A: **B** Part B: **D**	**2**
	Part A or Part B	**1**
5.	**B**	**1**
6.	**A**	**1**
7.	**A, B, E**	**2**
	Two correct and no more than one incorrect	**1**
8.	**A**	**1**
9.	**C**	**1**
10.	**A**	**1**
11.	Part A: **A** Part B: **C, E**	**2**
	Part A or Part B	**1**
12.	**B**	**1**
13.	**D**	**1**
14.	**C**	**1**
15.	**C**	**1**
16.	**D**	**1**
17.	**B, D, F**	**2**
	Two correct and no more than one incorrect	**1**
18.	**C**	**1**
19.	**B**	**1**
20.	**C**	**1**