

# Math

## Question Sampler



**Standard  
Paper**

**Aspire**  
**ACT**

P L U S



Student Name \_\_\_\_\_ Proctor Name \_\_\_\_\_

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# HIGH SCHOOL MATH SYMBOL LIST

+	Plus Sign	$\leq$	Less Than or Equal
-	Minus Sign	$\geq$	Greater Than or Equal
$\times$	Times Sign	$\sqrt[n]{\quad}$	General Root
$\div$	Division Sign	$\log$	Common Logarithm
$\frac{\square}{\square}$	Fraction	$^{\circ}$	Degree Sign
$\square\frac{\square}{\square}$	Mixed Number	$\pi$	Constant Pi
$y^x$	Exponent	$\infty$	Infinity
$\sqrt{\quad}$	Square Root	$i$	Imaginary i
$\sqrt[3]{\quad}$	Cube Root	$e$	Exponential e
=	Equal	$\theta$	Theta
(•)	Parenthesis	$\sin$	Sine
%	Percent	$\cos$	Cosine
$\pm$	Plus Minus Sign	$\tan$	Tangent
-	Negative Sign	$\sin^{-1}$	Inverse Sine
•	Times Dot	$\cos^{-1}$	Inverse Cosine
/	Division Slash	$\tan^{-1}$	Inverse Tangent
[•]	Bracket		
$ \cdot $	Absolute Value		
<	Less Than		
>	Greater Than		





# Mathematics Question Sampler

## Directions

This question sampler allows students to experience the types of items presented on the Utah Aspire Plus assessment. Items on the question sampler may not be representative of the level of content knowledge presented in the assessment. The question sampler should not be used to measure students' content knowledge.

Inside this question sampler are questions about mathematics. Some questions are multiple-choice/multiple-select, and others are text entry.

### **Multiple-choice/Multiple-select Questions:**

- Read the question and then choose the best answer/answers from the answer choices given.
- If you decide to change your answer, erase your first mark completely.
- It is best to mark an answer for every question even if you are not sure which answer is correct.

### **Text Entry Questions:**

- Write your entire answer inside the box that goes with the question.
- Use your best handwriting as your answers will be entered online by a test administrator.

### **Please Note:**

- Unless there is an indication otherwise, assume the following:
  1. Diagrams are NOT necessarily drawn to scale.
  2. Geometric figures are in a plane.
  3. The word “line” indicates a straight line.
  4. The word “average” indicates arithmetic mean (for example, 4 is the average of 2, 7, and 3).
- You may use a calculator for any questions you choose. Some questions are best answered without using a calculator.
- Any writing in your question sampler will NOT be scored. Your answers in the booklet will be entered online by a test administrator.
- Begin working on the question sampler when you are told to do so.

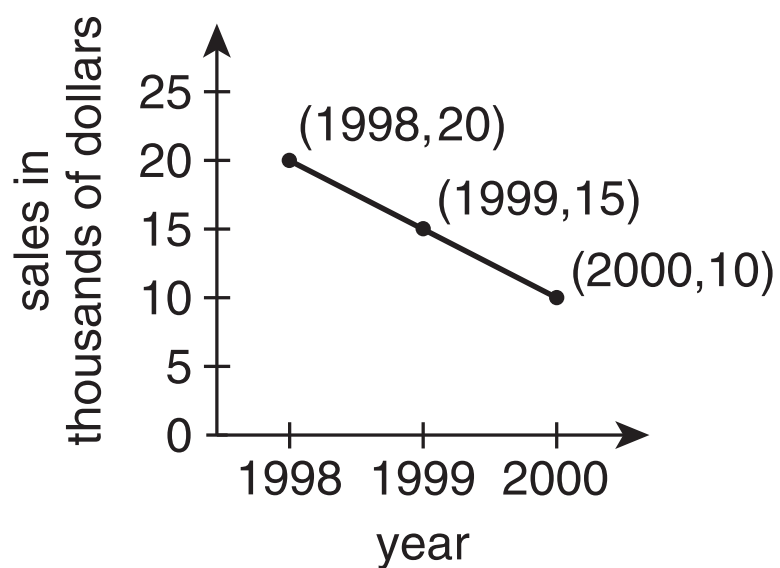
**GO ON TO THE NEXT PAGE.**

1. An expression is shown.

$$a^{\frac{4}{3}} \cdot a^{\frac{2}{3}}$$

What is the product of the two factors?

- (A)  $a^{\frac{2}{3}}$
- (B)  $a^{\frac{8}{9}}$
- (C)  $a^2$
- (D)  $a^{\frac{8}{3}}$
2. The graph below models a constant decrease in annual licorice sales for Licorice Company, Inc., from 1998 through 2000. The points have been connected to illustrate the trend. Which of the following values is closest to the amount, in dollars, of the decrease per year?



- (A) \$ 5,000
- (B) \$ 6,667
- (C) \$ 8,333
- (D) \$10,000
- (E) \$15,000

**DO YOUR FIGURING HERE.**

3. Mrs. Jones surveys her class about their siblings. In the class, 75% of the students have a brother, 82% have a sister, and 65% have both a brother and a sister.

What is the probability that a student has a brother or a sister?

Write your answer in the box using the digits 0 through 9, the decimal, or the negative sign. You may use up to seven characters.

**DO YOUR FIGURING HERE.**

4. A doctor surveys her patients to determine whether they have had back pain in the last 3 months. She also records whether they are shorter than 6 feet, or 6 feet tall or taller. Her results are summarized in the two-way table below.

	<b>Had back pain</b>	<b>Did not have back pain</b>	<b>Total</b>
Shorter than 6 feet	54	81	135
6 feet tall or taller	25	37	62
Total	79	118	197

One of the following conclusions is supported by the data in the table. Which one?

- Ⓐ People 6 feet tall or taller **always** have a higher frequency of back pain than people shorter than 6 feet.
- Ⓑ People shorter than 6 feet **always** have a higher frequency of back pain than people 6 feet tall or taller.
- Ⓒ People 6 feet tall or taller **are more likely than not** to have a higher frequency of back pain than people shorter than 6 feet.
- Ⓓ People shorter than 6 feet **are more likely than not** to have a higher frequency of back pain than people 6 feet tall or taller.
- Ⓔ There is no relationship between a person's height and having back pain.



5. A contingency table for a class is shown.

**Class Data**

	<b>Juniors</b>	<b>Seniors</b>	<b>Total</b>
<b>Females</b>	6	10	16
<b>Males</b>	9	7	16
<b>Total</b>	15	17	32

What is the probability that a student selected at random is a female given that the student is not a senior?

- Ⓐ 30%
- Ⓑ 40%
- Ⓒ 50%
- Ⓓ 60%
6. Vanessa and Vinny use two different containers to carry water to a pool.
- Vanessa makes  $A$  trips to the pool, and Vinny makes  $B$  trips to the pool.
  - Vanessa's container holds  $x$  gallons of water, and Vinny's container holds  $y$  gallons.

Create an expression that represents the average number of gallons of water carried every trip.

Write your answer in the box. You may use numbers, letters, or symbols from the High School Mathematics Symbol List.

**DO YOUR FIGURING HERE.**

7. A function is given.

$$f(x) = 7x + 9$$

Complete the table to show output values for a linear function  $g(x)$  that has a greater rate of change but the same  $y$ -intercept as  $f(x)$ .

Write your answer in the boxes using the digits 0 through 9, the decimal, or the negative sign. You may use up to seven characters.

$x$	$g(x)$
0	
1	
2	
3	

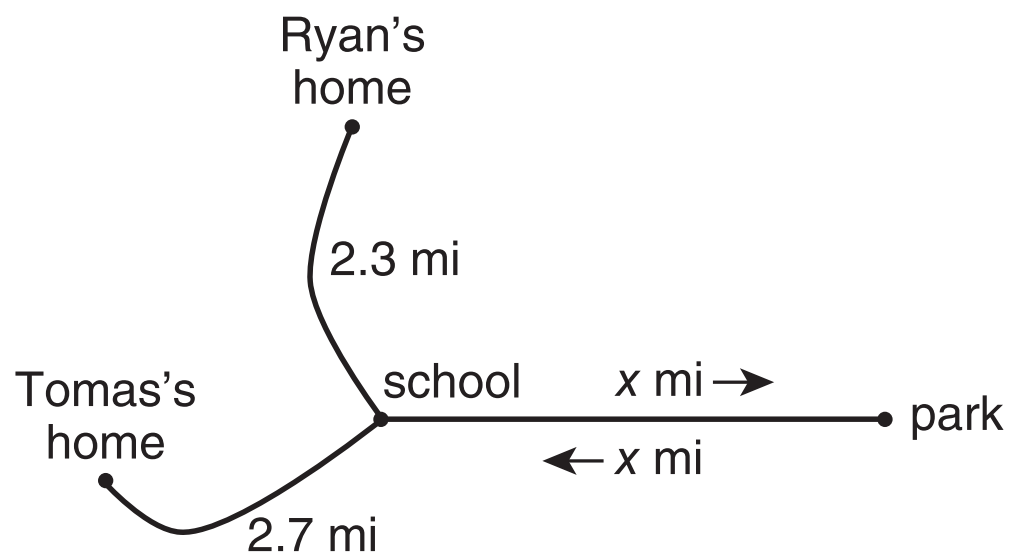
**DO YOUR FIGURING HERE.**

8. Ryan and Tomas walked to school and then to the park, as described below:

Ryan walked 2.3 miles from his home to meet Tomas at school.

Tomas walked 2.7 miles from his home to meet Ryan at school.

Once they were at school, the boys walked  $x$  miles to the park and then  $x$  miles back to the school.



The sum of the distance Ryan walked and the distance Tomas walked was at least 15 miles but not more than 21 miles. One of the following is the graph of the possible values of  $x$ . Which one?

- (A)
- (B)
- (C)
- (D)
- (E)

**DO YOUR FIGURING HERE.**

9. A system of linear equations is given.

$$3x + 2y = 7$$

$$2x - 3y = -4$$

What are the  $x$ - and  $y$ -values of the solution to the system?

Write your answer in the boxes using the digits 0 through 9, the decimal, or the negative sign. You may use up to seven characters.

$x =$

$y =$

**DO YOUR FIGURING HERE.**

**10.** The function  $f(x)$  is shown.

$$f(x) = 2x^3 - x^2 + \frac{1}{2}x$$

Let  $g(x) = f\left(\frac{2}{3}x\right)$ .

What is  $g(x)$  in terms of  $x$ ?

Write your answer in the box. You may use numbers, letters, or symbols from the High School Mathematics Symbol List.

**11.** Select all the numbers that could be the sum of a rational number and an irrational number.

- A 4.076923076923...
- B 5.236067977567...
- C 3.116666666666...
- D 9.605555127513...
- E 6.714285714285...
- F 2.718281828582...

**DO YOUR FIGURING HERE.**

12. An equation of the line passing through the points  $(-5, -2)$  and  $(3,4)$  in the standard  $(x,y)$  coordinate plane can be written in the form  $ax + by = c$ , where  $a$ ,  $b$ , and  $c$  are integers with no common factor other than 1, and  $a$  is positive.

What is the value of  $a$ ?

Write your answer in the box. You may use the digits 0 through 9, the decimal, or the plus sign. You may use up to two characters.

$a =$

13. On a given day on a certain poultry farm, the relative frequencies of chickens, ducks, and geese that laid an egg or did not lay an egg are given in the table below. Two of the relative frequencies are given by letters.

	Laid an egg	Did not lay an egg	Total
Chickens	$a$	0.33	1.00
Ducks	0.45	0.55	1.00
Geese	0.48	$b$	1.00

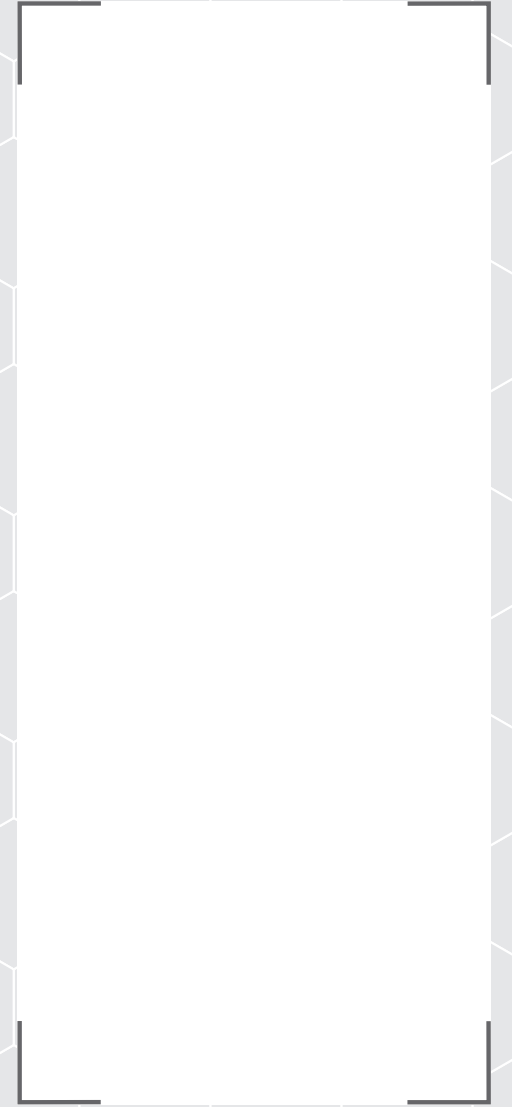
If it can be determined, what is the sum of the values of  $a$  and  $b$  in this table?

- Ⓐ 0.19
- Ⓑ 0.67
- Ⓒ 1.19
- Ⓓ 1.80
- Ⓔ Cannot be determined from the given information





Pearson



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