

VIRGINIA STANDARDS OF LEARNING

GRADE 8 MATHEMATICS

2023 Mathematics Standards of Learning

Practice Item Set

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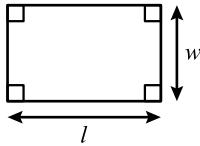
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Middle School Mathematics Formula Sheet

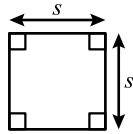
2023 Mathematics Standards of Learning

Geometric Formulas



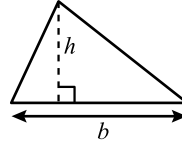
$$p = 2l + 2w$$

$$A = lw$$

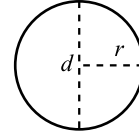


$$p = 4s$$

$$A = s^2$$



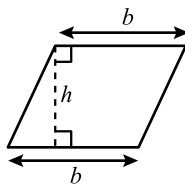
$$A = \frac{1}{2}bh$$



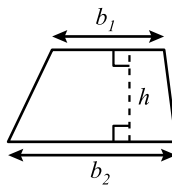
$$C = 2\pi r$$

$$C = \pi d$$

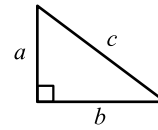
$$A = \pi r^2$$



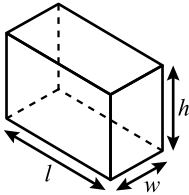
$$A = bh$$



$$A = \frac{1}{2}h(b_1 + b_2)$$



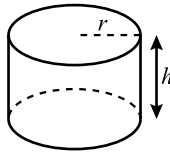
$$a^2 + b^2 = c^2$$



$$V = lwh$$

$$V = Bh$$

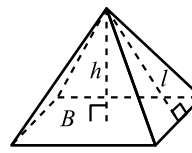
$$S.A. = 2lw + 2lh + 2wh$$



$$V = \pi r^2 h$$

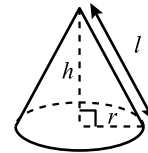
$$V = Bh$$

$$S.A. = 2\pi r^2 + 2\pi rh$$



$$V = \frac{1}{3}Bh$$

$$S.A. = \frac{1}{2}lp + B$$



$$V = \frac{1}{3}\pi r^2 h$$

$$V = \frac{1}{3}Bh$$

$$S.A. = \pi r^2 + \pi rl$$

Abbreviations

milligram	mg
gram	g
kilogram	kg
milliliter	mL
liter	L
kiloliter	kL
millimeter	mm
centimeter	cm
meter	m
kilometer	km
square centimeter	cm ²
cubic centimeter	cm ³

ounce	oz
pound	lb
quart	qt
gallon	gal.
inch	in.
foot	ft
yard	yd
mile	mi.
square inch	sq in.
square foot	sq ft
cubic inch	cu in.
cubic foot	cu ft

Area	<i>A</i>
Area of Base	<i>B</i>
Circumference	<i>C</i>
Perimeter	<i>p</i>
Surface Area	<i>S.A.</i>
Volume	<i>V</i>

Pi

$$\pi \approx 3.14$$

$$\pi \approx \frac{22}{7}$$

1 Two friends went out to dinner. The total bill was \$38.90 before tax and tip.

- **The tax rate was 5.5%.**
- **They wanted to tip 20% on the total before tax.**

Which expression could NOT be used to estimate the total cost including tax and tip?

- A** $40(1.26)$
- B** $40(0.06) + 40(0.2)$
- C** $40 + 40(0.2 + 0.06)$
- D** $40 + 40(0.06) + 40(0.2)$

2 The original price of a holiday decoration was \$28. The price decreased to \$0.60 after the holiday was over. Which is closest to the percent decrease in the holiday decoration price?

- F** 114%
- G** 98%
- H** 46%
- J** 27%

3 Which number has a value between $-\sqrt{9}$ and π ?

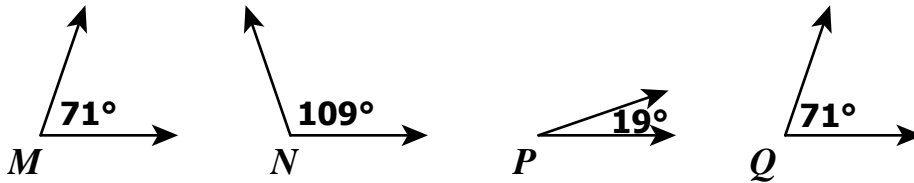
A $\frac{13}{4}$

B $-\frac{18}{6}$

C 3.1×10^2

D 3.2×10^{-2}

4 Look at these angles.



Which two angles are complementary?

F $\angle M$ and $\angle Q$

G $\angle N$ and $\angle P$

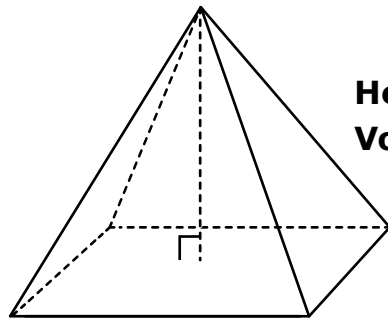
H $\angle P$ and $\angle Q$

J $\angle M$ and $\angle N$

5 Angle C and angle D are supplementary. The measure of angle D is 72° . What is the measure of angle C?

- A 18°
- B 72°
- C 108°
- D 162°

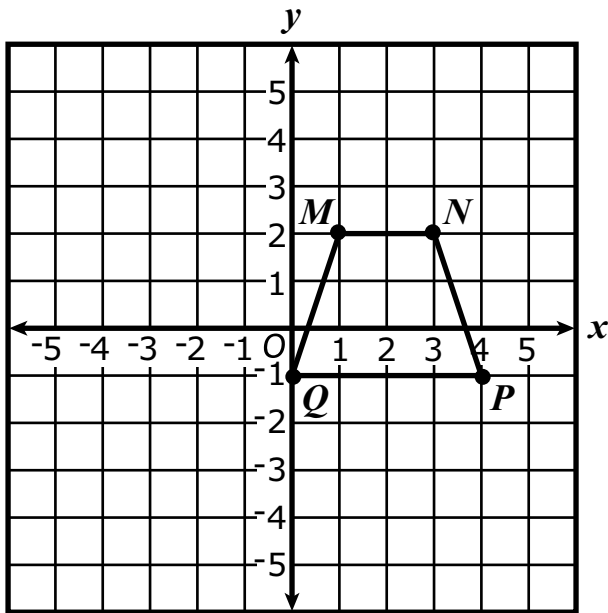
6 A student made the square-based pyramid shown. What is the area of the base of this pyramid?



Height = 9 inches
Volume = 588 cubic inches

- F 196 sq in.
- G 65 sq in.
- H 49 sq in.
- J 14 sq in.

7 Trapezoid $MNPQ$ is graphed on the coordinate plane.



Trapezoid $MNPQ$ will be translated 3 units to the left and 2 units down. Which of these best represents the coordinates of N' ?

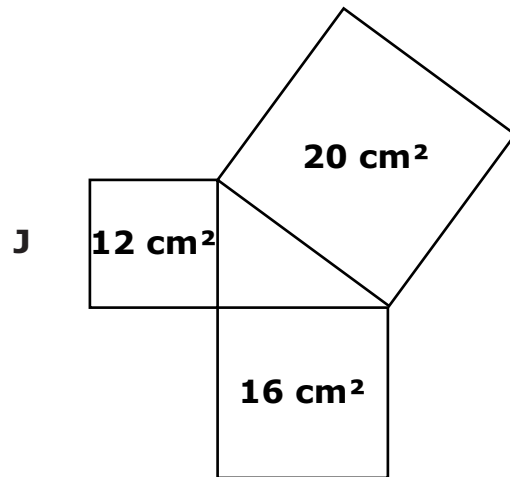
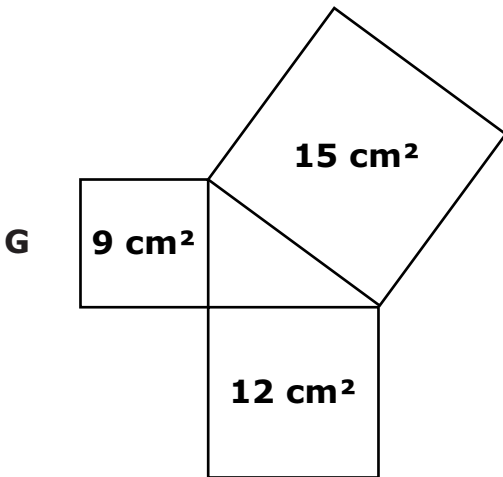
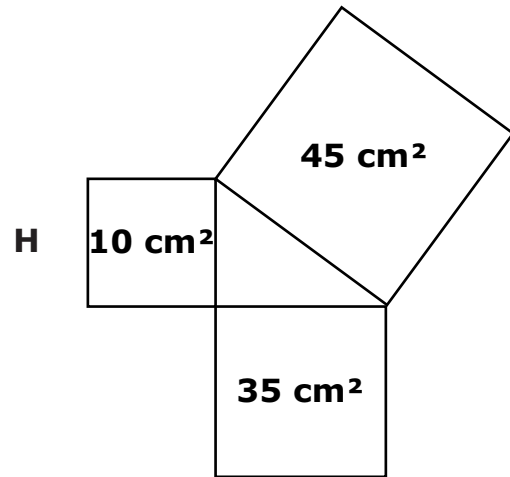
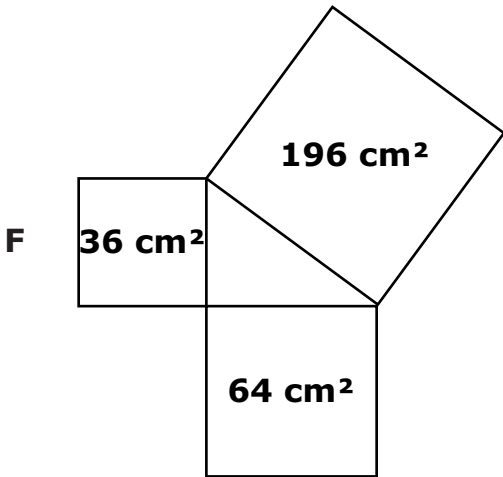
A $(0, 0)$

C $(0, 4)$

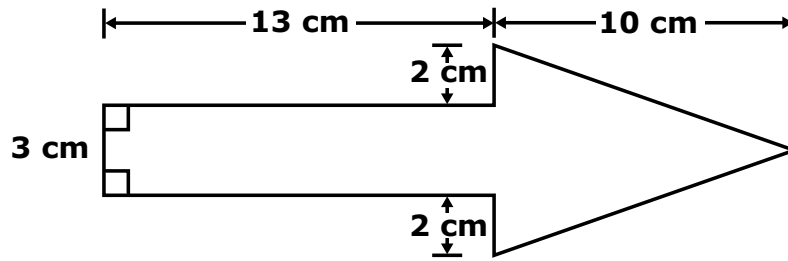
B $(1, -1)$

D $(6, 4)$

- 8 Each model shown consists of three squares and a triangle. The areas of the squares are given in square centimeters. For which model could the Pythagorean Theorem be used to prove that the triangle is a right triangle? Note: Models are not drawn to scale.



9 A composite figure is shown.



What is the area of this figure?

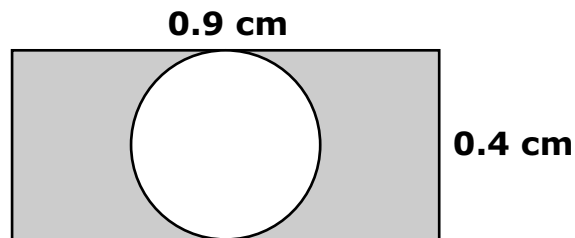
A 30 cm^2

C 59 cm^2

B 54 cm^2

D 74 cm^2

10 A rectangle as shown has a length of 0.9 centimeters and a width of 0.4 cm. A circle is drawn inside that touches the rectangle at two points.



Which is closest to the area of the shaded region in the rectangle?

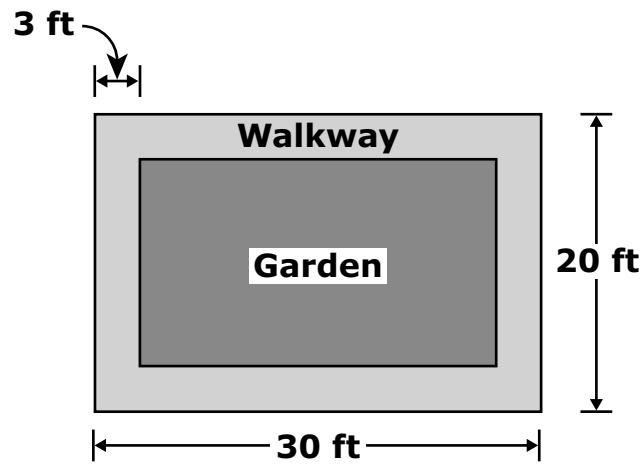
F 0.14 cm^2

G 0.23 cm^2

H 0.28 cm^2

J 0.49 cm^2

- 11 Leslie built a walkway, around a rectangular garden as shown. The walkway is the same width on all sides of the garden.



What is the perimeter of this garden?

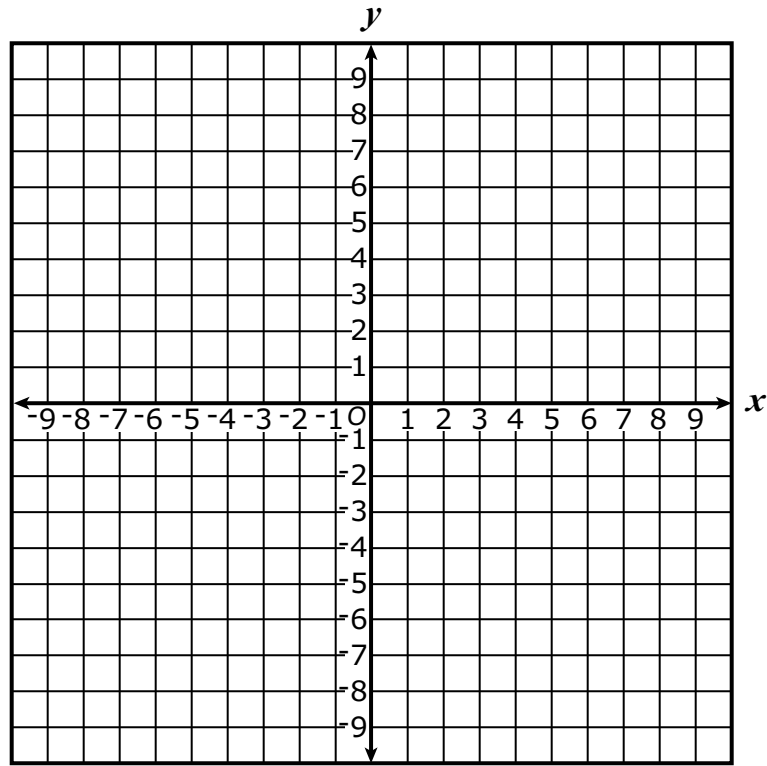
- A 100 ft
B 94 ft
C 88 ft
D 76 ft
- 12 Which set has a domain of $\{2, 3\}$ and a range of $\{5, 8\}$?
- F $\{(2, 8), (3, 5), (5, 8)\}$
G $\{(3, 5), (2, 5), (8, 3)\}$
H $\{(2, 8), (3, 5)\}$
J $\{(5, 2), (8, 3)\}$

13 Some students are selling candy bars to raise money to purchase new gym equipment. The more candy bars they sell, the more money they raise. Which of these is the independent variable in this situation?

- A** The amount of money raised
- B** The number of students
- C** The number of candy bars sold
- D** The cost of new gym equipment

14 A line contains the points represented by this table of values. A blank grid is provided.

x	y
1	4
3	6
5	8

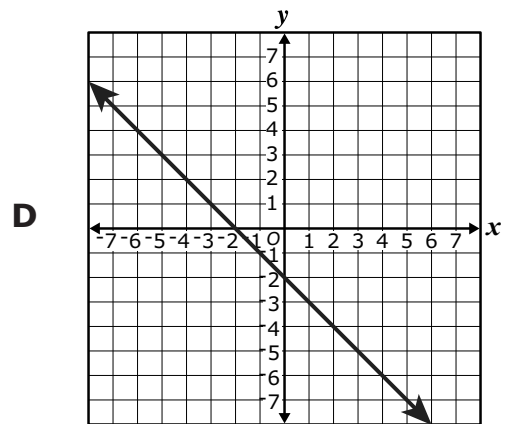
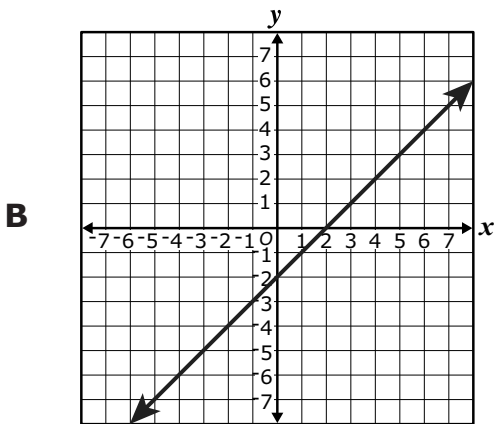
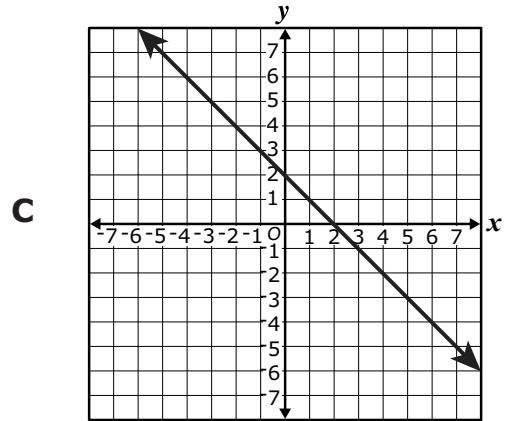
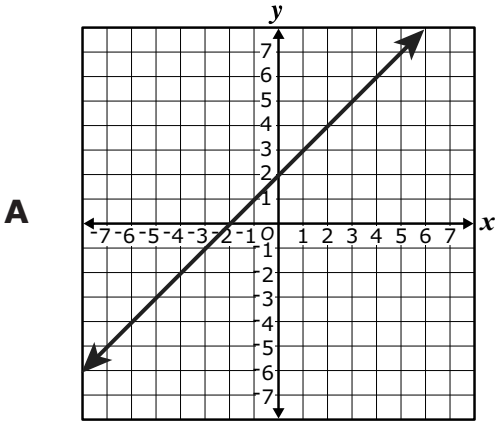


This line has a y -intercept of —

- F 0
- G 1
- H 2
- J 3

15 Which graph appears to contain all the ordered pairs in this table?

x	y
-5	-3
0	2
3	5



- 16 Aaron has 5 ounces of water in a container. He adds 2.6 ounces of water each minute. Which table of values represents the number of ounces of water in the container, y , after x minutes?

F

x	y
2	5.2
5	13.0

H

x	y
2	15.2
5	38.0

G

x	y
2	10.2
5	18.0

J

x	y
2	18.2
5	26.0

- 17 Which equation represents all the values in the table?

x	y
1	1
3	5
4	7

- A** $y = -2x + 3$
B $y = -x + 11$
C $y = x + 2$
D $y = 2x - 1$

18 What value of p makes this equation true?

$$2p = \frac{-3(p + 2)}{4}$$

F $\frac{6}{5}$

G $\frac{6}{11}$

H $-\frac{6}{11}$

J $-\frac{6}{5}$

19 The math club had \$200 to buy supplies for t-shirt decorating.

- They spent \$10 for the first t-shirt and \$8 for each additional t-shirt.
- They purchased y t-shirts.

Which inequality best represents this situation?

A $10(y - 1) + 8 \geq 200$

B $10 + 8(y - 1) \geq 200$

C $10(y - 1) + 8 \leq 200$

D $10 + 8(y - 1) \leq 200$

20 Greta has 2 bags of tiles that are all the same size and shape.

- **Bag A has 1 blue tile and 3 green tiles.**
- **Bag B has 2 yellow tiles and 4 black tiles.**

Which of these best describes dependent events?

- F** Randomly selecting one tile from Bag A, replacing the tile, then randomly selecting another tile from Bag A
- G** Randomly selecting one tile from Bag B, not replacing the tile, then randomly selecting another tile from Bag B
- H** Randomly selecting one tile from Bag A, replacing the tile, then randomly selecting one tile from Bag B
- J** Randomly selecting one tile from Bag B, not replacing the tile, then randomly selecting one tile from Bag A

21 A spinner has four equal sections labeled W , X , Y , and Z . A fair coin has faces labeled heads and tails. Edward will spin the arrow of the spinner and flip the coin one time each. What is the probability the arrow will land on the section labeled Z and the coin will land with heads face-up?

- A** $\frac{1}{8}$
- B** $\frac{1}{4}$
- C** $\frac{1}{3}$
- D** $\frac{1}{2}$

22 Stella has some colored cards that are the same size and shape.

- **The probability of randomly selecting a blue card is 20%.**
- **The probability of randomly selecting a red card is 30%.**

What is the probability Stella will randomly select a card that is NOT blue, replace it, then randomly select a card that is red?

- F 6%**
- G 14%**
- H 24%**
- J 50%**

Directions: Use the following information to answer question 23.

Emma is on the school golf team. Her scores from 15 practice rounds are shown.

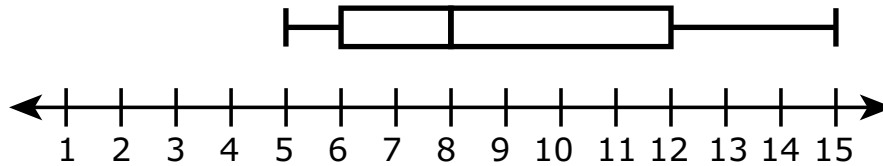
**93, 95, 102, 107, 107, 108, 111, 113, 114, 114, 115, 118, 120,
120, 125**

23 From the sample scores collected, can you perform a non-biased statistical analysis for the school golf team?

- A** Yes, because the golfer is in the school
- B** No, because the scores are only from practice rounds
- C** No, because the scores are only from one member of the golf team
- D** Yes, because the data include scores from a large number of practice rounds

End of Set

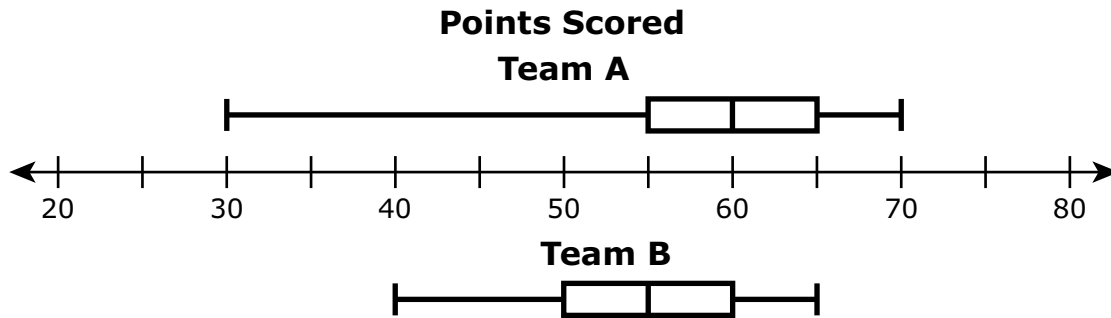
- 24 A baker recorded the number of batches of cookies he made on each of seven days. He baked a different number of batches of cookies each day. This boxplot summarizes his data.



The baker baked 30 batches of cookies on the eighth day. He redraws the boxplot to include the additional data. Which statement comparing the new boxplot to the original boxplot is NOT true?

- F The median increased.
- G The lower extreme increased.
- H The upper extreme increased.
- J The value of the interquartile range increased.

- 26 The number of points scored by two basketball teams is summarized in these boxplots.



- Team A scored a different number of points in each of the team's 14 games.
- Team B scored a different number of points in each of the team's 13 games.

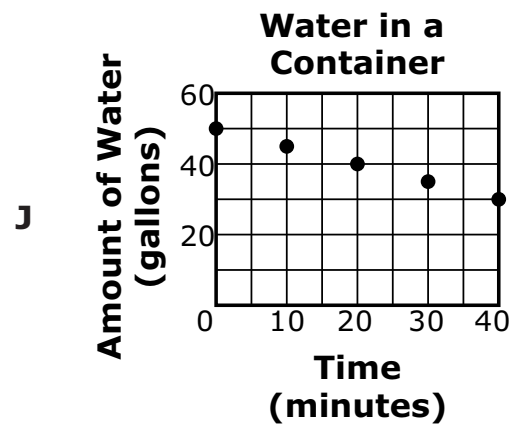
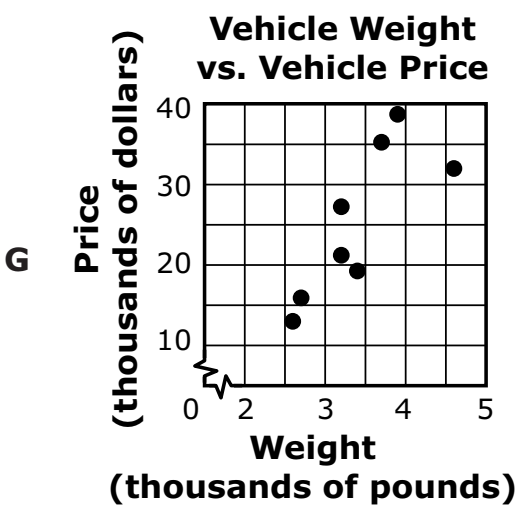
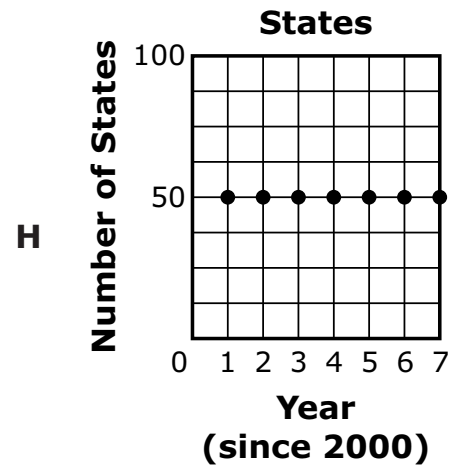
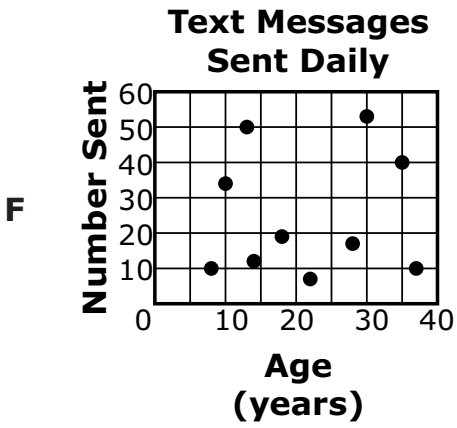
What is the total number of games in which Team A and Team B each scored 55 or more points?

- F 13
G 14
H 16
J 18
- 27 A student will collect data about fertilizer and its effect on grass. The student will create a scatterplot to display the amount of fertilizer used and the height of grass after 2 weeks.

To create this scatterplot, the student does NOT need to include —

- A the height of the grass samples
B the amount of fertilizer for each sample
C the amount of water for each sample
D the number of grass samples

28 Which scatterplot shows data with a negative relationship?



**Grade 8 Mathematics
Practice Item Set Spring 2025
Answer Key**

Sequence Number	Correct Answer	Reporting Category	Reporting Category Description
1	B	001	Number, Number Sense, Computation and Estimation
2	G	001	Number, Number Sense, Computation and Estimation
3	D	001	Number, Number Sense, Computation and Estimation
4	H	002	Measurement and Geometry
5	C	002	Measurement and Geometry
6	F	002	Measurement and Geometry
7	A	002	Measurement and Geometry
8	H	002	Measurement and Geometry
9	D	002	Measurement and Geometry
10	G	002	Measurement and Geometry
11	D	002	Measurement and Geometry
12	H	003	Probability, Statistics, Patterns, Functions, and Algebra
13	C	003	Probability, Statistics, Patterns, Functions, and Algebra
14	J	003	Probability, Statistics, Patterns, Functions, and Algebra
15	A	003	Probability, Statistics, Patterns, Functions, and Algebra
16	G	003	Probability, Statistics, Patterns, Functions, and Algebra
17	D	003	Probability, Statistics, Patterns, Functions, and Algebra
18	H	003	Probability, Statistics, Patterns, Functions, and Algebra
19	D	003	Probability, Statistics, Patterns, Functions, and Algebra
20	G	003	Probability, Statistics, Patterns, Functions, and Algebra
21	A	003	Probability, Statistics, Patterns, Functions, and Algebra
22	H	003	Probability, Statistics, Patterns, Functions, and Algebra
23	C	003	Probability, Statistics, Patterns, Functions, and Algebra
24	G	003	Probability, Statistics, Patterns, Functions, and Algebra
25	B	003	Probability, Statistics, Patterns, Functions, and Algebra
26	J	003	Probability, Statistics, Patterns, Functions, and Algebra
27	C	003	Probability, Statistics, Patterns, Functions, and Algebra
28	J	003	Probability, Statistics, Patterns, Functions, and Algebra

