Reference Sheet for Grade 7 Mathematics ISAT

All students in grade 7 will be provided with a reference sheet to use during all sessions of the mathematics assessment. This reference sheet is shown below.

ISAT MATHEMATICS REFERENCE SHEET
Grades 7 and 8

FORMULAS FOR PLANE FIGURES

Parallelogram: $A = bh$

Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$
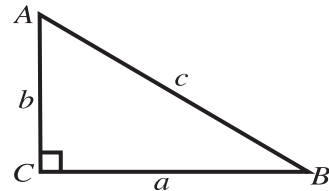
Triangle: $A = \frac{1}{2}bh$

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

$A = \pi r^2$

Right Triangle:

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

FORMULAS FOR SOLID FIGURES

Prism: $V = Bh$ (B is the area of the base.)

Right Cylinder: $V = \pi r^2 h$

Regular Pyramid: $V = \frac{1}{3}Bh$ (B is the area of the base.)

1

Which is another way to write $7^3 + 5^4$?

A $(7 \cdot 3) + (5 \cdot 4)$
B $(7 \cdot 7 \cdot 7) + (5 \cdot 5 \cdot 5 \cdot 5)$
C $(73) + (54)$
D $(7 + 7 + 7) + (5 + 5 + 5 + 5)$

2

Seven students bought enough pencils to share equally among themselves.

Which could be the number of pencils they bought?

27	38	56	64
A	B	C	D

3

A ketchup packet contains $\frac{3}{16}$ ounce of ketchup. How many packets can be made using 24 ounces of ketchup?

4.5	9	72	128
A	B	C	D

4

Jade used mental math to multiply 7(52). She used the following steps:

First step: 7(50 + 2)
Second step: 7(50) + 7(2)

What property does this represent?

A   Associative Property
B   Additive Inverse Property
C   Commutative Property
D   Distributive Property

5

Jonathon correctly determined that 12.9 divided by 8.6 is equal to 1.5.

Which shows how Jonathon could check his answer?

A 1.5×8.6 C $\dfrac{1.5}{12.9}$

B 12.9×1.5 D $\dfrac{8.6}{12.9}$

GO ON ▶

6

A square has an area of approximately 750 square feet.

The length of the side of the square is between which two whole numbers?

A   20 and 21 feet
B   24 and 25 feet
C   27 and 28 feet
D   30 and 31 feet

7

Angela is 4 feet 7 inches tall. Angela's doll is 11 inches tall. What is the ratio of Angela's height to the doll's height?

A   1:5
B   11:4.7
C   4.7:11
D   5:1

8

The ratio of the number of girls to the number of boys in a class is 3 to 2. There are 18 girls in the class.

How many boys are in the class?

23	12	3	2
A	B	C	D

9

A diagram of a tile floor is shown below. It is covered with square tiles that are all the same size.

KEY
■ Border tile
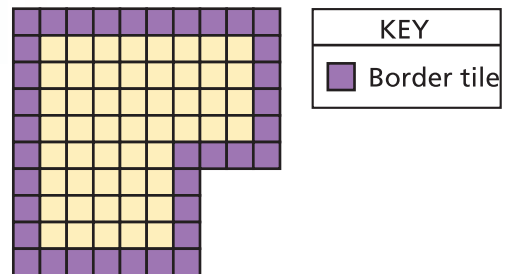
Which is closest to the percent of border tiles that make up the entire tile floor?

A   36%   C   49%
B   41%   D   52%

GO ON ▶
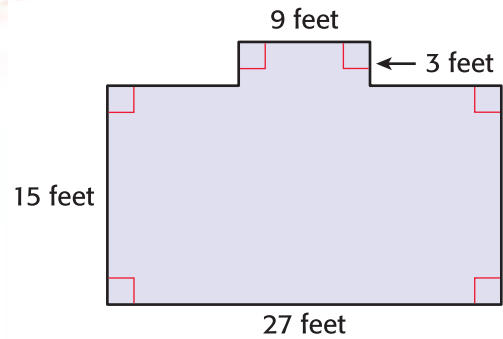
10

Use your inch ruler to help you answer this question.

P

R   Q
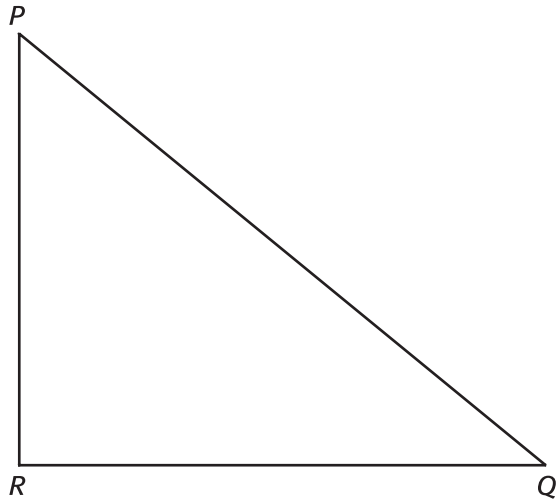
Which is closest to the perimeter in inches of triangle *PQR*?

A   7 inches

B $7\frac{1}{2}$ inches

C   8 inches
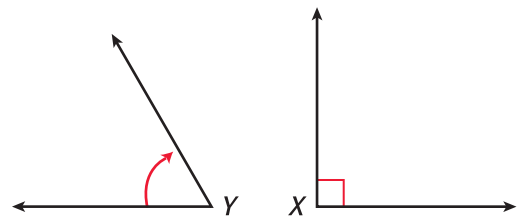
D $8\frac{1}{2}$ inches

11

9 feet

← 3 feet

15 feet

27 feet

What is the area, in square feet, of the polygon shown above?

A   90 square feet
B   144 square feet
C   405 square feet
D   432 square feet

12

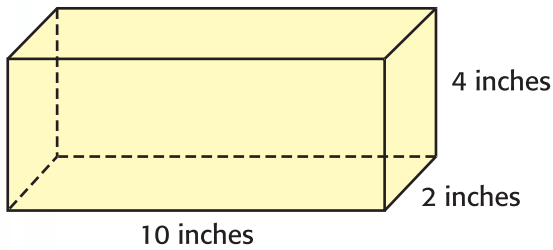Two angles are drawn below. The measure of angle *X* is 90°.

Y   X

Which best represents the measure of angle *Y* ?

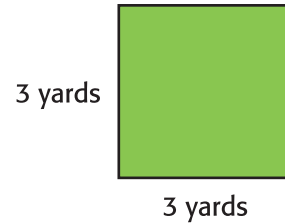| 20°	60°	100°	120°
A	**B**	**C**	**D**

13

What is the surface area of this rectangular prism?

4 inches

2 inches

10 inches

- **A**   136 square inches
- **B**   120 square inches
- **C**   80 square inches
- **D**   16 square inches

14

The area of the square below is 9 square yards.

3 yards

3 yards

What is the area of the square in square feet?

- **A**   12 square feet
- **B**   27 square feet
- **C**   54 square feet
- **D**   81 square feet

15

The table below shows Jan's pattern between the number of squares made and the number of toothpicks used.

Number of Squares	Number of Toothpicks	Picture
1	4	
2	7	
3	10	
4	13	
n	?	

Which expression can Jan use to determine the number of toothpicks used to make n squares?

$4n$

A

$4n - 1$

B

$3n + 1$

C

$3n - 1$

D

GO ON▶

16

A cheese pizza costs $6.00 not including tax. Additional toppings may be added for $0.85 each.

Which expression represents the cost of a cheese pizza with t additional toppings?

A $6.85t$
B $6.00t + 0.85t$
C $6.00 + 0.85t$
D $6.00t + 0.85$

17

Which of the following expressions is equivalent to $3x + 5 + x + 10 + 2y$?

A $6x + 15$
B $3x + 2y + 15$
C $4x + 2y + 15$
D $9x + 12y$

18

Which of the following is equivalent to the expression below?

$$x + 7 - 3x + 2x^2 + 13$$

A $6x^2 + 13$
B $4x^2 + 20$
C $2x^2 - 4x + 13$
D $2x^2 - 2x + 20$

19

Which expression is equivalent to $5(2a + 9)$?

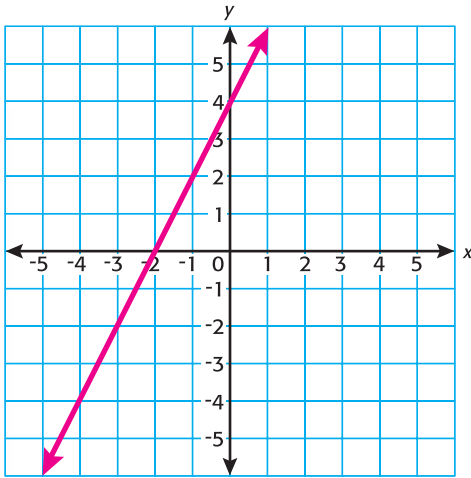A $10a + 45$
B $7a + 14$
C $7a + 45$
D $10a + 9$

20

What is the value of the expression below when $x = 6$ and $y = {}^-4$?

$$x + 2y^2$$

A ${}^-38$ C 38
B ${}^-26$ D 70

GO ON ▶

21

The graph of a line is shown on the grid below.

Which equation best represents the graph of the line?

A $y = {}^-2x - 2$
B $y = {}^-2x + 4$
C $y = 2x - 2$
D $y = 2x + 4$

22

Which inequality best represents the graph below?

A $x \leq 2$ C $x < 2$
B $x > 2$ D $x \geq 2$

23

Max scored 12 points in the first half of a basketball game. In the second half, Max scored only 3-point baskets. He scored a total of 21 points in the game. The number of 3-point baskets Max scored is represented by t.

Which equation correctly represents this situation?

A $12 + 3t = 21$
B $12t + 3 = 21$
C $12 - 3t = 21$
D $21t = 12 + 3$

24

What values of x satisfy this inequality?

$$3x - 4 > 38$$

A $x > 14$
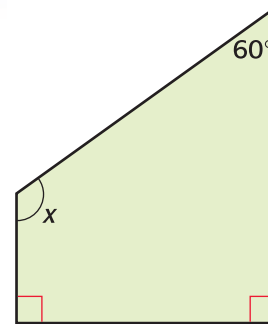B $x < 14$
C $x > 11$
D $x < 11$

GO ON▶

25

Frank scored 7 points in the first half and 9 points in the second half of the basketball game. The total points he scored represented $\frac{1}{5}$ of the total points his team scored.

How many total points did his team score?

A　35 points
B　45 points
C　72 points
D　80 points

26

Which figure satisfies all the following conditions?

- has more than three lines of symmetry
- has all sides equal in length
- has at least one set of parallel sides
- has more than one interior obtuse angle

A　Square
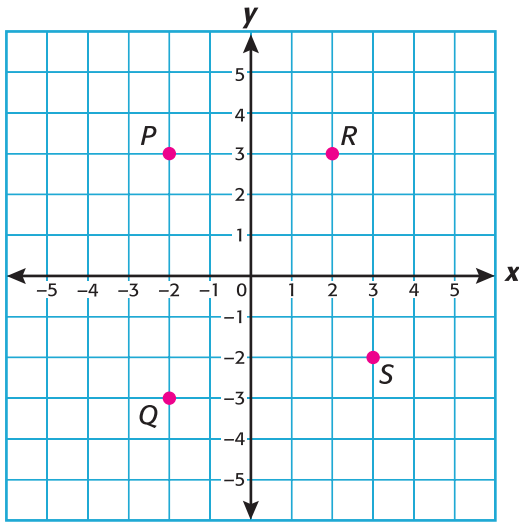B　Rhombus
C　Regular hexagon
D　Equilateral triangle

27

What is the value of x in this polygon?

120°	150°	240°	300°
A	B	C	D

28

Points M, N, Q, Y, Z, and X all lie on circle P.
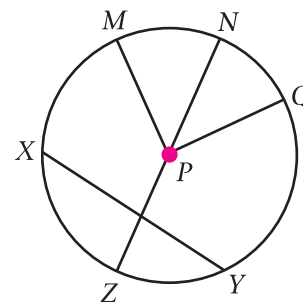
Which represents the diameter of circle P?

A　$\overline{PM}$　　　　C　$\overline{XY}$
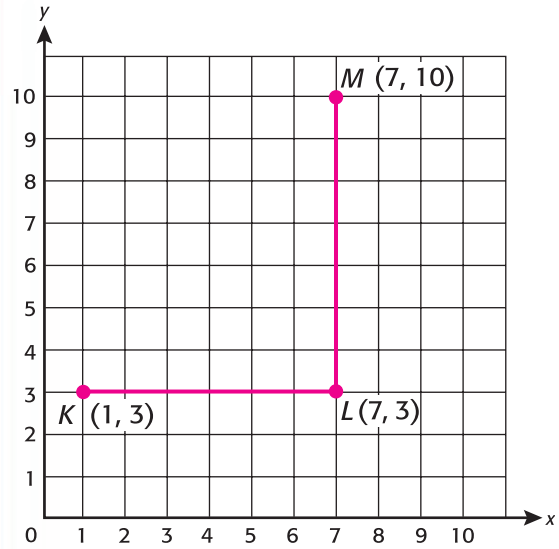B　$\overline{ZN}$　　　　D　$\overline{PQ}$

GO ON ▶

29

Which point best represents the coordinates (3, -2)?

A	*P*	**C**	*R*
B	*Q*	**D**	*S*

30

Points *K*, *L*, and *M* are three of the vertices of rectangle *KLMN*.

What are the coordinates of vertex *N* to create rectangle *KLMN*?

A	(7, 7)	**C**	(10, 3)
B	(1, 10)	**D**	(10, 1)

GO ON▶

31

4 cm

4 cm
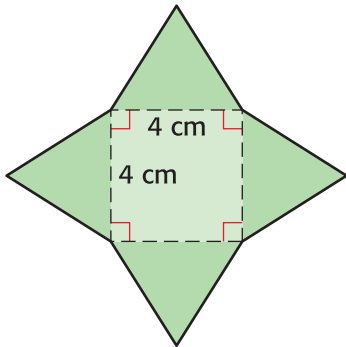
What three-dimensional shape could be formed by folding this figure on the dashed line segments?

A   Rectangular prism
B   Square pyramid
C   Triangular prism
D   Triangular pyramid

32

The dimensions of rectangle *N* are half the dimensions of rectangle *M*.

M   *N*

Which of the following must be true about the two rectangles?

A   The area of rectangle *N* is half the area of rectangle *M*.
B   The perimeter of rectangle *N* is equal to the perimeter of rectangle *M*.
C   The area of rectangle *N* is equal to the area of rectangle *M*.
D   The perimeter of rectangle *N* is half the perimeter of rectangle *M*.
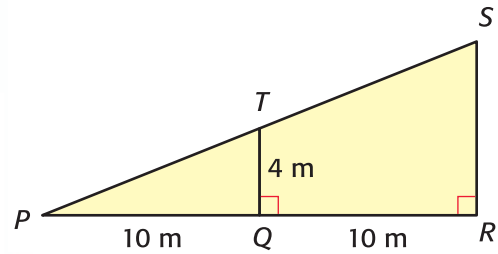
GO ON▶

33

A gardener wants to enclose all four sides of a rectangular vegetable garden.

What dimensions should the gardener use in order to enclose the maximum area with 100 feet of fencing?

A   10 ft by 10 ft
B   15 ft by 35 ft
C   25 ft by 25 ft
D   35 ft by 65 ft

34

Triangle *PQT* is similar to triangle *PRS*.

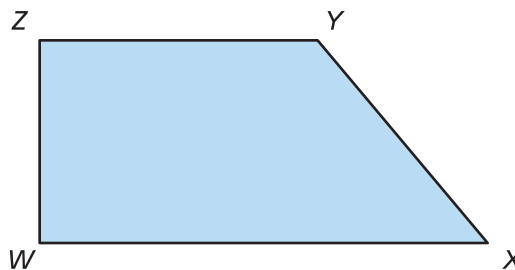

What is the length of $\overline{SR}$?

8 m   10 m   14 m   20 m
A   **B**   **C**   **D**

GO ON▶

35

Figure *KLMN* is similar to figure *WXYZ*.
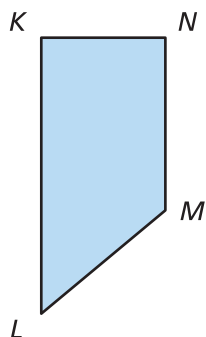
Which side in figure *KLMN* corresponds to $\overline{WX}$ in figure *WXYZ*?

A $\overline{KN}$ **B** $\overline{NM}$ **C** $\overline{ML}$ **D** $\overline{KL}$

36

Look at the circle graph shown below.

Which set of bars could be used to create a bar graph that best represents the data in the circle graph?

A

B

C

D

GO ON▶

37

Which scatter plot shows the line that best fits the data points given?
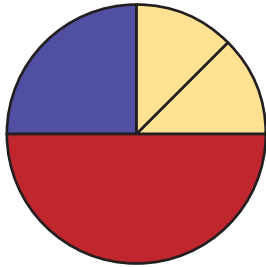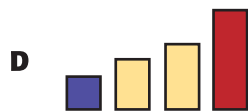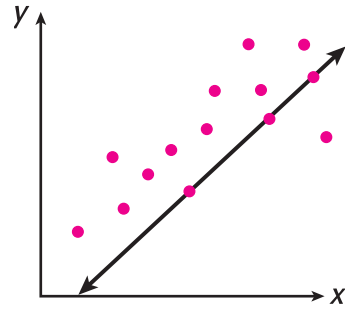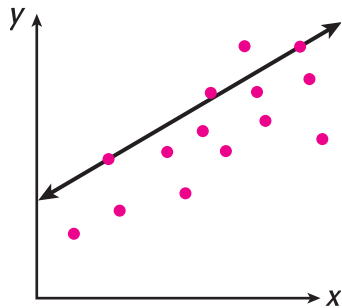

A

C

B

D

GO ON▶
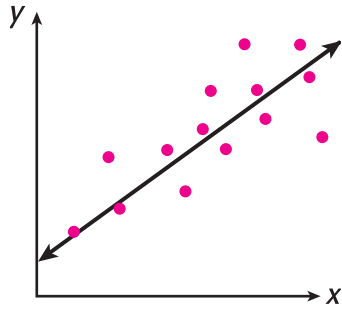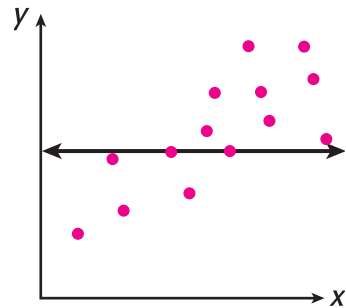
38

Jo needs an 85% average on her five math tests. She earned 99%, 85%, 79%, and 88% on her first four tests.

What score must she earn on her fifth test in order to have an average of exactly 85% for all five tests?

74%	79%	85%	88%
A	**B**	**C**	**D**

40

A hamburger restaurant offers 5 different combinations of hamburgers. There are french fries, tater tots, onion rings, and fried mushrooms that can be ordered as sides.

How many different combinations of one hamburger and one side are possible?

2	5	9	20
A	**B**	**C**	**D**

39

Karen has 2 bags of marbles. The marbles in each bag are the same size.

- Bag 1 has only 4 red and 2 white marbles.
- Bag 2 has only 3 red and 7 white marbles.

Karen will choose 1 marble from each bag without looking. What is the probability that she will choose a red marble from each bag?

$\dfrac{1}{5}$	$\dfrac{7}{16}$	$\dfrac{7}{9}$	$\dfrac{6}{7}$
A	**B**	**C**	**D**

GO ON ▶

41

Which situation represents a proportional relationship?

Filling a Swimming Pool
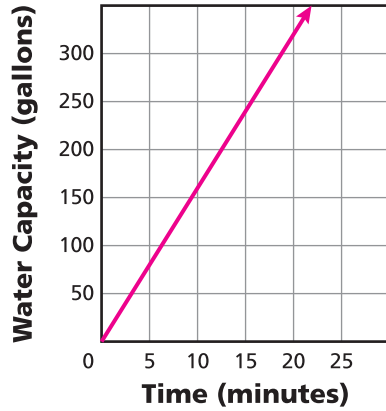
A

Driving Speed
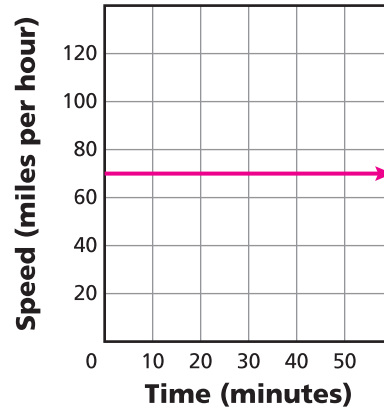
C

Distance from Home
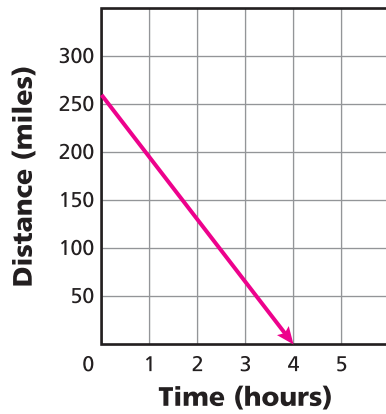
B

Lawn Care Cost
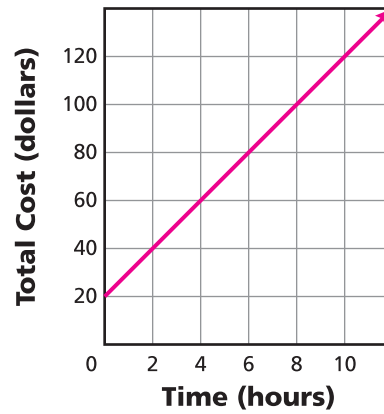
D

42

Point *J* and point *K* are graphed on the number line.

-5 -4 -3 -2 -1 0 1 2 3 4 5
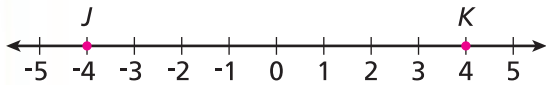
What number is an equal distance from point *J* and point *K*?

A   0

B   1

C   4

D   8

43

This square pyramid is sliced by a plane through the pyramid's vertex and square base.
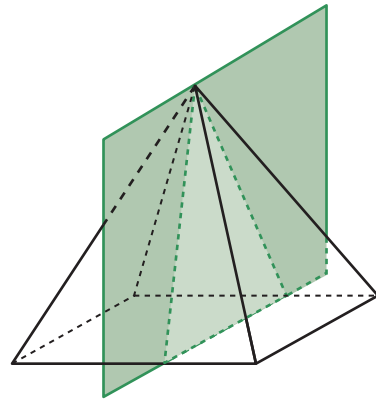
What is the shape of the two-dimensional cross section?

A   Rhombus

B   Square

C   Trapezoid

D   Triangle

GO ON▶

44

Dave went fishing at the lake.

- He caught 6 catfish, 4 carp, and 2 bass.
- The fish Dave caught represent a proportional sample of the fish population in this lake.

Based on this sample, which statement is true?

A Dave is as likely to catch a carp as he is to catch a catfish.

B Dave is less likely to catch a carp than he is to catch a bass.

C Dave is as likely to catch a carp or a bass as he is to catch a catfish.

D Dave is more likely to catch a carp than he is to catch a catfish or a bass.

45

A game piece is red (R) on one side and yellow (Y) on the other side. Each color is equally likely to show after the game piece is tossed.

This table shows the possible results of tossing the game piece 3 times.

Results of 3 Tosses

RRR	RRY	RYR	YRR
YYY	YYR	YRY	RYY

What is the probability of getting red exactly two times in 3 tosses?

$\frac{2}{8}$ $\frac{3}{8}$ $\frac{5}{8}$ $\frac{6}{8}$

A **B** **C** **D**

STOP

Answer Key with Assessment Objectives Identified

Item Number	Correct Answer	Assessment Objective
1	B	**6.7.04** Represent repeated factors using exponents.
2	C	**6.7.07** Solve problems involving descriptions of numbers, including characteristics and relationships (e.g., square numbers, prime/composite, prime factorization, greatest common factor, least common multiple).
3	D	**6.7.08** Solve problems and number sentences involving addition, subtraction, multiplication, and division using integers, fractions, and decimals.
4	D	**6.7.10** Identify and apply the following properties of operations with rational numbers: – the commutative and associative properties for addition and multiplication; – the distributive property; – the additive and multiplicative identity properties; – the additive and multiplicative inverse properties; and – the multiplicative property of zero.
5	A	**6.7.11** Demonstrate and apply the relationships between addition/subtraction and multiplication/division with rational numbers.
6	C	**6.7.13** Estimate the square root of a number less than 1,000 between two whole numbers (e.g., $\sqrt{41}$ is between 6 and 7).
7	D	**6.7.14** Create and explain ratios that represent a given situation.
8	B	**6.7.15** Use proportional reasoning to model and solve problems.
9	B	**6.7.16** Read, write, recognize, model, and interpret percents from 0% to 100%.
10	D	**7.7.02** Solve problems involving the perimeter and area of polygons and composite figures using diagrams, models, and grids or by measuring or using given formulas (may include sketching a figure from its description).
11	D	**7.7.02** Solve problems involving the perimeter and area of polygons and composite figures using diagrams, models, and grids or by measuring or using given formulas (may include sketching a figure from its description).
12	B	**7.7.03** Compare and estimate length (including perimeter), area, volume, weight/mass, and angles (0° to 180°) using referents.
13	A	**7.7.04** Determine the volume and surface area of a right rectangular prism using an appropriate formula or strategy.
14	D	**7.7.05** Solve problems involving unit conversions <u>within the same measurement system</u> for length, weight/mass, capacity, and square units (e.g., 1 ft^2 = 144 in^2).
15	C	**8.7.01** Determine a missing term in a sequence, extend a sequence, and construct and identify a rule that can generate the terms of an arithmetic or geometric sequence.
16	C	**8.7.02** Write an expression using variables to represent unknown quantities.

Item Number	Correct Answer	Assessment Objective
17	C	**8.7.03** Simplify algebraic expressions by identifying and combining like terms.
18	D	**8.7.03** Simplify algebraic expressions by identifying and combining like terms.
19	A	**8.7.04** Recognize equivalent forms of algebraic expressions.
20	C	**8.7.05** Evaluate or simplify algebraic expressions with one or more integer variable values (e.g., $a^2 + b$ for $a = 3$ and $b = -4$).
21	D	**8.7.07** Represent linear equations and quantitative relationships on a rectangular coordinate system, and interpret the meaning of a specific part of a graph.
22	A	**8.7.09** Identify, graph, and interpret inequalities on a number line.
23	A	**8.7.10** Represent and analyze problems with linear equations and inequalities.
24	A	**8.7.11** Solve linear equations in one variable (e.g., $2x + 3 = 13$) and inequalities involving $<$ or $>$ (e.g., $2x < 6$, $x + 7 > 10$).
25	D	**8.7.12** Solve word problems involving unknown quantities.
26	C	**9.7.02** Solve problems involving two– and three–dimensional shapes.
27	A	**9.7.03** Solve problems using properties of triangles and quadrilaterals (e.g., opposite sides of a parallelogram are congruent).
28	B	**9.7.04** Identify, describe, and determine the radius and diameter of a circle.
29	D	**9.7.05** Graph points and identify coordinates of points on the Cartesian coordinate plane (all four quadrants).
30	B	**9.7.06** Represent and identify geometric figures using coordinate geometry.
31	B	**9.7.11** Identify a three–dimensional object from its net.
32	D	**9.7.12** Recognize which attributes (such as shape, perimeter, and area) change or don't change when plane figures are composed, decomposed, or rearranged.
33	C	**9.7.12** Recognize which attributes (such as shape, perimeter, and area) change or don't change when plane figures are composed, decomposed, or rearranged.
34	A	**9.7.14** Determine if figures are similar, and identify relationships between corresponding parts of similar figures.
35	D	**9.7.14** Determine if figures are similar, and identify relationships between corresponding parts of similar figures.
36	A	**10.7.02** Compare different representations of the same data.
37	A	**10.7.04** Identify a reasonable approximation of the line of best fit from a set of data or a scatter plot.
38	A	**10.7.05** Determine and use the mode, range, median, and mean to interpret data.

Item Number	Correct Answer	Assessment Objective
39	A	**10.7.06** Solve problems involving the probability of a simple or compound event, including representing the probability as a fraction, decimal, or percent.
40	D	**10.7.08** Solve simple problems involving the number of ways objects can be arranged (permutations and combinations).
41	A	**7.RP.2a** Recognize and represent proportional relationships between quantities. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
42	A	**7.NS.1b** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
43	D	**7.G.3** Describe the two-dimensional figures that result from slicing three dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
44	C	**7.SP.7b** Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
45	B	**7.SP.8a** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

To view all the mathematics assessment objectives, download the *Illinois Mathematics Assessment Framework* for Grades 3–8 online at www.isbe.net/assessment/IAFindex.htm.