



International Subject Test— Math 1 Practice Test

The ACT[®] International Subject Test—Math 1 Practice Test is an official AIST practice test. The full-length Math 1 Practice Test consists of items drawn from the International Subject Test Math 1 formative assessment pool and adheres to the AIST Math 1 Test Specifications.

This PDF file includes Math 1 Practice Test questions and answer keys. Taking the AIST Official full-length practice test is the best way to prepare for the two sessions of the AIST Math 1 test.

Math 1

60 Minutes—50 Questions

For each question, first decide which answer is correct. Then, click the circle next to your answer to select that answer. If you decide to change your answer, click the circle next to your new answer.

You are permitted to use an approved calculator on this test. You may use your calculator for any problems you choose. Some of the problems may require a calculator; some of the problems may best be solved without using a calculator. A Reference Sheet has been included in this Math 1 Practice Test, beginning on the next page.

Note: Unless otherwise indicated, all of the following assumptions apply to these problems.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word **line** indicates a straight line.
4. The word **average** indicates the arithmetic mean.

Your score will be based only on the number of questions you answer correctly during the time allowed. Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test. You will NOT be penalized for guessing. **It is to your advantage to answer every question even if you must guess.**

If you finish before time ends, you should use the time remaining to reconsider questions you are uncertain about.

Math 1 Reference Sheet

Lines

Standard Form	$Ax + By = C$	A , B , and C are constants, where $A \neq 0$ or $B \neq 0$.
Slope-Intercept Form	$y = mx + b$	m = slope
Point-Slope Form	$y - y_1 = m(x - x_1)$	b = y -intercept
Slope	$m = \frac{y_2 - y_1}{x_2 - x_1}$	(x_1, y_1) and (x_2, y_2) are 2 points.

Quadratics

General Form	$ax^2 + bx + c = 0$	a , b , and c are constants, where $a \neq 0$.
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	

Coordinate Geometry

Midpoint	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	(x_1, y_1) and (x_2, y_2) are 2 points.
Distance	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	

Area, Volume, and Surface Area of Polygons and Solids

Triangle	$A = \frac{1}{2}bh$	A = area
Parallelogram	$A = bh$	b = base
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$	h = height
Regular Polygon	$A = \frac{1}{2}ap$	a = apothem
Prism	$V = Bh$	p = perimeter
Right Prism	$SA = 2B + Ph$	V = volume
Circular Cylinder	$V = \pi r^2 h$	B = area of base
Right Circular Cylinder	$SA = 2\pi r^2 + 2\pi rh$	SA = surface area
Pyramid	$V = \frac{1}{3}Bh$	P = perimeter of base
Right Pyramid	$SA = B + \frac{1}{2}Ps$	r = radius
Circular Cone	$V = \frac{1}{3}\pi r^2 h$	s = slant height
		$\pi \approx 3.14$

Right Circular Cone $SA = \pi r^2 + \pi rs$

Sphere $V = \frac{4}{3}\pi r^3$

$SA = 4\pi r^2$

Interior Angles of Polygons

Degree Measure in a Regular Polygon $\frac{180(n-2)}{n}$ $n = \text{number of sides}$

Sum of Degree Measures in a Polygon $180(n-2)$

Circles

Center-Radius Form $(x-h)^2 + (y-k)^2 = r^2$ center (h,k)

Area $A = \pi r^2$ $r = \text{radius}$

Circumference $C = \pi d = 2\pi r$ $A = \text{area}$

Area of Sector $A = \frac{\theta}{360}\pi r^2$ $C = \text{circumference}$
 $d = \text{diameter}$

$\theta = \text{degree measure of central angle}$

$\pi \approx 3.14$

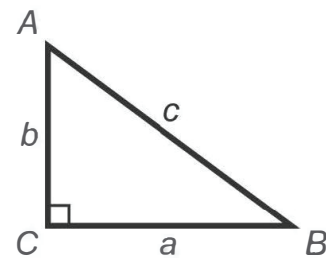
Right Triangles

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

Trigonometric Ratios $\sin A = \frac{a}{c}$

$$\cos A = \frac{b}{c}$$

$$\tan A = \frac{a}{b}$$



Sequence and Series

Arithmetic Sequence $a_n = a_1 + (n-1)d$ $n = \text{term number}$

Arithmetic Series $s_n = \frac{n}{2}(a_1 + a_n)$ $a_n = \text{nth term}$
 $d = \text{common difference}$

$s_n = \text{sum of the first } n \text{ terms}$

Interest

Simple Interest

$$I = prt$$

I = interest

Compound Interest

$$A = p\left(1 + \frac{r}{n}\right)^{nt}$$

p = principal

r = annual interest rate

t = time in years

A = amount of money after
 t years

n = compound periods
per year

Miscellaneous

Distance, Rate, Time

$$D = rt$$

D = distance

Direct Variation
(y varies directly with x)

$$y = kx$$

r = rate

t = time

Indirect Variation
(y varies indirectly with x)

$$y = \frac{k}{x}$$

k = variation constant

Key to Symbols

$\triangle ABC$ triangle ABC

$\angle ABC$ angle ABC

$m\angle ABC$ degree measure of $\angle ABC$

\overleftrightarrow{AB} line AB

\overline{AB} line segment AB

AB length of \overline{AB}

Circle O circle with center point O

\widehat{AB} arc AB

\perp is perpendicular to

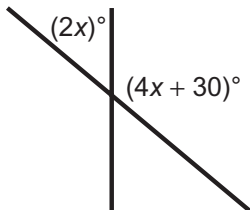
\parallel is parallel to

\cong is congruent to

\sim is similar to

\approx is approximately equal to

1. What is the complete factorization of the expression $x^2 - 16$?
- A. $(x + 4)^2$
B. $(x - 4)^2$
C. $(x - 4)(x + 4)$
D. $(x + 1)(x - 16)$
2. Catherine has a bag of beads. She has 30 red beads, 25 blue beads, and 27 green beads. If she randomly draws 1 bead from the bag, what is the probability it will be blue?
- A. $\frac{57}{82}$
B. $\frac{30}{82}$
C. $\frac{27}{82}$
D. $\frac{25}{82}$
3. The graph of a quadratic function has x -intercepts at $(-4, 0)$ and $(1, 0)$. What are the zeros of this quadratic function?
- A. 4 and 1
B. 4 and -1
C. -4 and 1
D. -4 and -1
4. Two lines intersect to form this figure. What is the value of x ?

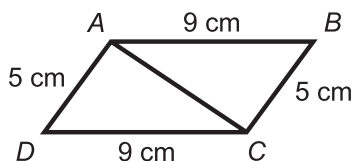


- A. 10
B. 20
C. 25
D. 35
5. What is the value of $\frac{(x - 3)(x + 6x)}{x}$ when $x = -1$?
- A. 20
B. 14
C. -10
D. -28

6. A juicer can extract an amount of apple juice equal to 85% of the weight of the apples. Which equation models the amount of juice, a , that the juicer can extract from x pounds of apples?

- A. $a = \frac{0.85}{x}$
- B. $a = 85x$
- C. $a = 0.85x$
- D. $a = \frac{85}{x}$

7. In this figure, $\triangle ABC \cong ?$

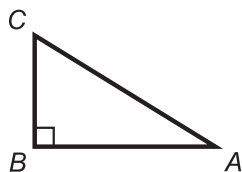


- A. $\triangle ADC$
- B. $\triangle ACD$
- C. $\triangle CAD$
- D. $\triangle CDA$

8. Teresa invested \$1,000 in an account that yields 5% annual interest. Use the formula $I = prt$ to find the amount of interest Teresa earned after 5 years.

- A. \$26,000
- B. \$25,000
- C. \$1,250
- D. \$250

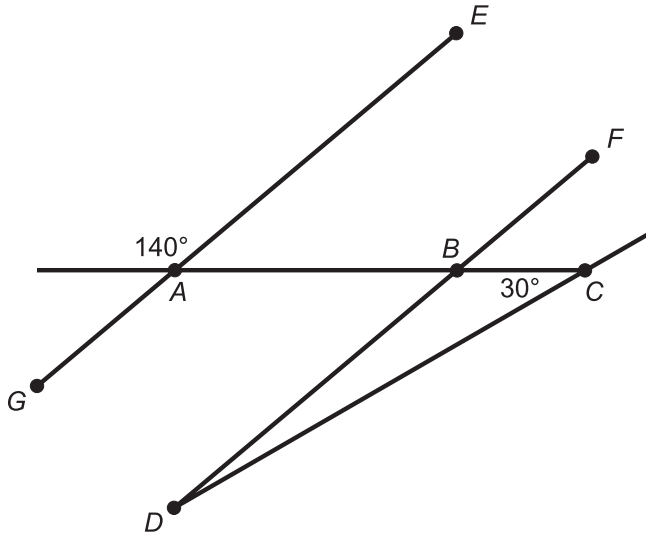
9. In this figure, $\triangle ABC$ has a right angle at B and the measure of $\angle BAC$ is 30° . If \overline{AC} is 12 units long, how many units long is \overline{BC} ?



- A. $\sqrt{3}$
- B. 4
- C. 6
- D. $6\sqrt{3}$

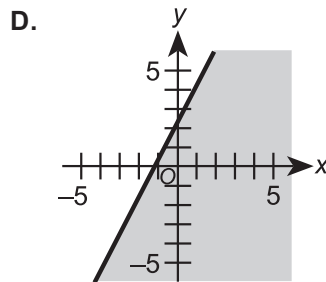
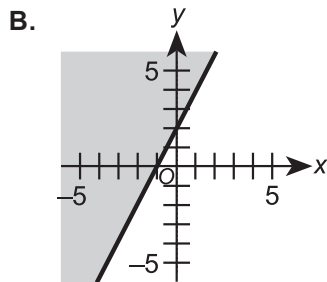
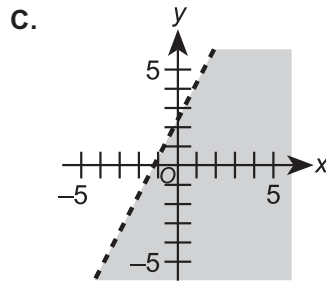
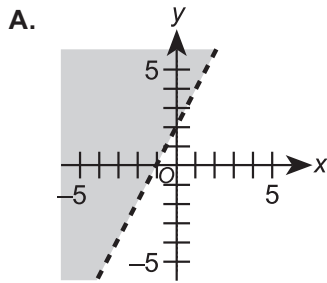
10. Alphonso bends a wire that is 36 cm long to form a rectangle. The length of the rectangle is 2 times its width. What is the width, in centimeters, of the rectangle?
- A. 4.5
 B. 6.0
 C. 7.2
 D. 12.0
11. What is the equation, in standard form, of the line that passes through $(-5,6)$ and has a slope of 2?
- A. $-2x + y = -4$
 B. $-2x + y = 11$
 C. $-2x + y = 16$
 D. $-5x + 6y = 2$
12. What point is the x-intercept of the graph of the function $f(x) = -x^2 + 4x - 4$?
- A. $(-4,0)$
 B. $(-2,0)$
 C. $(2,0)$
 D. $(4,0)$

13. In the figure, if \overline{GE} and \overline{DF} are parallel, what is $m\angle BDC$?



- A. 110°
 B. 40°
 C. 30°
 D. 10°

14. Which graph represents the inequality $\frac{6y+15}{3} \leq 4x+9$?



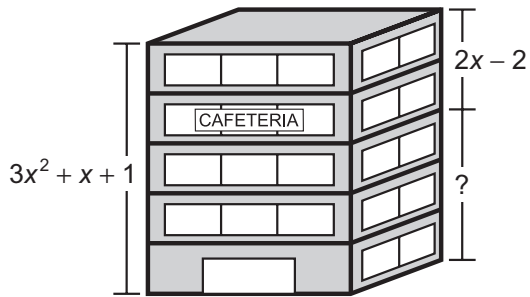
15. What is the completely simplified form of $5\sqrt{7} - \sqrt{63} + 7\sqrt{(21)(3)}$?

- A. $59\sqrt{7}$
- B. $35\sqrt{7}$
- C. $26\sqrt{7}$
- D. $23\sqrt{7}$

16. The local newspaper sells ads at a constant rate per square inch. A 3-inch-by-4-inch ad costs \$25. Susan has a budget of \$150 to run a 9-inch-by-12-inch ad. Can she purchase a 9-inch-by-12-inch ad and stay within her budget?

- A. Yes, because the ad will cost \$75.
- B. Yes, because the ad will cost \$108.
- C. No, because the ad will cost \$200.
- D. No, because the ad will cost \$225.

17. Kane made this model of an office building.



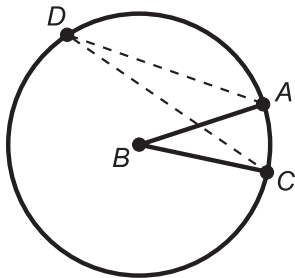
The expression $3x^2 + x + 1$ represents the building's total height in feet. The expression $2x - 2$ represents the distance, in feet, between the top of the building and the floor of the cafeteria. What is the distance between the ground and the floor of the cafeteria?

- A. $3x^2 - x + 3$
- B. $3x^2 - x - 1$
- C. $3x^2 - 3x - 2$
- D. $3x^2 + x - 3$

18. What is the value of $\sqrt{4x^3}$ when $x = 9$?

- A. 6
- B. 18
- C. 54
- D. 108

19. In circle B , $m\angle ABC = 30^\circ$. What is $m\angle CDA$?

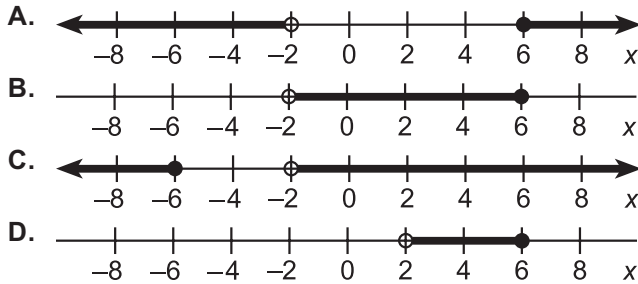


- A. 60°
- B. 30°
- C. 15°
- D. 10°

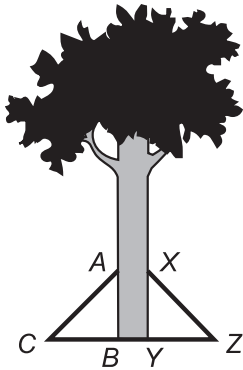
20. Rosa can wash 15 cars in 6 hours. If Joel and Tony help Rosa and work at the same rate as she does, how many hours will it take them to wash 15 cars?
- A. 2
 B. 3
 C. 5
 D. 9

21. Which number line shows the solution set of this compound inequality?

$$2x - 9 \leq 3 \text{ and } 3(x + 8) > 18$$



22. A tree planted on level ground is supported by cords of equal length and is perpendicular to the ground as shown in this figure. The cords are tied to the tree 3 feet above the ground and are staked at points C and Z, which are equidistant from the tree. Which statement explains how you can prove $\angle C \cong \angle Z$?



- A. $\angle C \cong \angle Z$ by the AA theorem.
 B. $\triangle ABC \cong \triangle XYZ$ by the AAS theorem, and $\angle C \cong \angle Z$ because corresponding parts of congruent triangles are congruent.
 C. $\angle C \cong \angle Z$ by the ASA theorem.
 D. $\triangle ABC \cong \triangle XYZ$ by the SSS postulate, and $\angle C \cong \angle Z$ because corresponding parts of congruent triangles are congruent.

23. When a student subtracts 18 from a number, the result is $\frac{1}{4}$ of the number. What is the number?
- A. 6
 - B. 18
 - C. 24
 - D. 36

24. Evaluate this expression for $x = \frac{1}{2}$ and $y = \frac{1}{3}$:

$$x^2y - (x^2 - y^2) + xy^2$$

- A. 0
 - B. $\frac{1}{23}$
 - C. $\frac{2}{35}$
 - D. $\frac{2}{9}$
25. Dina found that $\frac{x^2}{4} - 4x + 16$ represents the area of a square. Which expression represents a side of this square?
- A. $\frac{x}{2} + 4$
 - B. $\frac{x}{2} - 4$
 - C. $\frac{x}{2} + 2$
 - D. $\frac{x}{2} - 2$

26. Solve the equation $12x^2 - 2x = 4$.

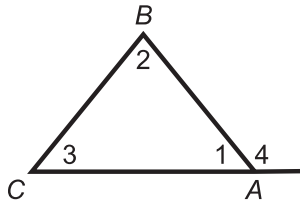
- A. $x = \frac{1}{2}$ or $-\frac{1}{2}$
- B. $x = \frac{2}{3}$ or $-\frac{1}{2}$
- C. $x = \frac{2}{3}$ or -1
- D. $x = -\frac{2}{3}$ or $\frac{1}{2}$

27. Which expression is the completely simplified form of $\frac{(6x^{-8}y^3)(-x^5y^{-1})}{(2x^{-1}y^2)^3}$?

- A. $-\frac{3}{4y^4}$
- B. $-3x^{-37}y^{-9}$
- C. $\frac{3}{4x^{10}y^4}$
- D. $3y^{-2}$

28. Given: $\triangle ABC$ with exterior $\angle 4$

Prove: $m\angle 4 = m\angle 2 + m\angle 3$



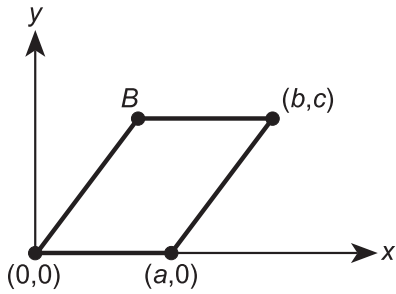
Statements	Reasons
1. $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$	
2. $m\angle 1 + m\angle 4 = 180^\circ$	
3. $m\angle 1 + m\angle 4 =$ $m\angle 1 + m\angle 2 + m\angle 3$	
4. $m\angle 4 + m\angle 2 + m\angle 3$	

To complete the proof, what is the correct order of Reasons I–IV ?

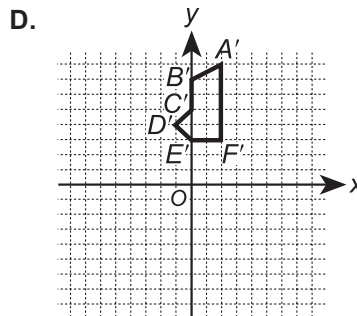
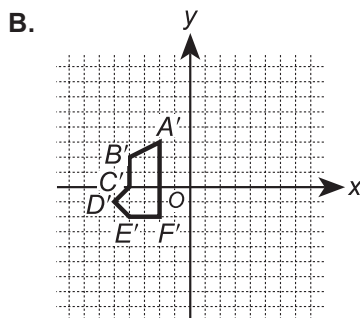
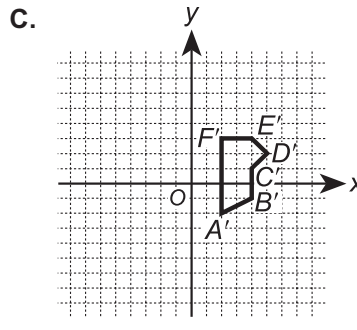
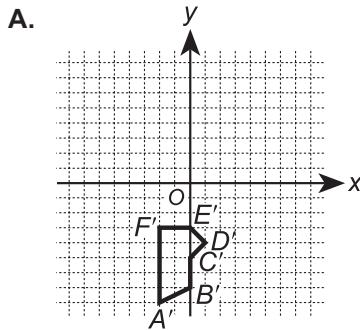
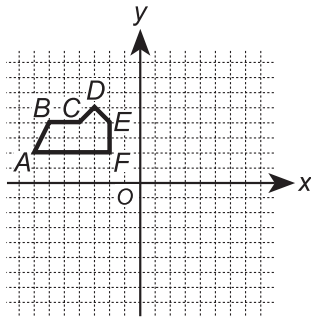
- I. Substitution Property
- II. Definition of Straight Angle
- III. Subtraction Property
- IV. The sum of the measures of the angles in a triangle is 180° .

- A. IV, II, I, III
- B. IV, II, III, I
- C. II, IV, I, III
- D. II, IV, III, I

29. The vertices of a parallelogram have coordinates as shown in this figure. What are the coordinates of B ?

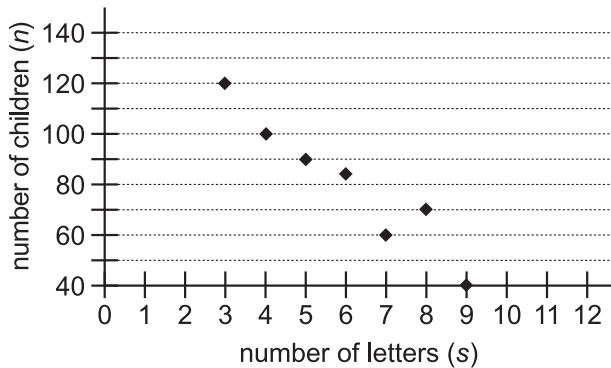


- A. $(c, b - a)$
 B. $(a - b, c)$
 C. $(b - a, c)$
 D. $(c, a - b)$
30. Hexagon $ABCDEF$ is reflected across the x -axis to create $A'B'C'D'E'F'$, which is then rotated 90° counterclockwise about point F' . Which figure shows the final image?



31. A total of 140 children participated in a spelling competition. This graph shows the relation between the number of children, n , who spelled words correctly and the number of letters, s , in the word spelled.

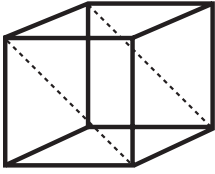
Spelling Competition



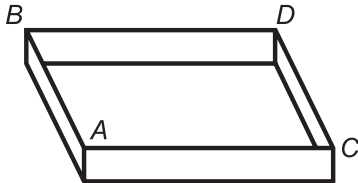
Which equation most closely approximates the line of best fit?

- A. $n = -11s + 150$
 B. $n = -20s + 165$
 C. $n = 11s + 150$
 D. $n = 20s + 165$
32. Mary solved this system of equations:
- $$\begin{cases} \frac{1}{2}x + \frac{1}{4}y = 6 \\ \frac{1}{5}x + \frac{1}{3}y = 1 \end{cases}$$
- What is the solution, (x,y) ?
- A. (8,8)
 B. (-15,12)
 C. (-5,6)
 D. (15,-6)
33. The height of a triangle is 16 inches greater than 8 times the length of its base. If the area of the triangle is 60 in^2 , what is the length of the base in inches?
- A. 2
 B. 3
 C. 5
 D. 7

34. An industrial technology student cuts a solid wood cube into 2 congruent pieces along the diagonals of opposite faces of the cube. The surface area of the cube is 54 in^2 . What is the surface area, in square inches, of each prism created by the cut?



- A. 27
 B. $18 + 9\sqrt{2}$
 C. 36
 D. $27 + 9\sqrt{2}$
35. Which point lies on the locus of points equidistant from $(2,3)$ and $(-5,3)$?
- A. $(6,-1.5)$
 B. $(-1.5,6)$
 C. $(1.5,1)$
 D. $(1,1.5)$
36. Clare wants to build a rectangular frame for the base of a shed. She knows $\angle ABD$ is a right angle. Which statement would **not** guarantee that the frame is rectangular?



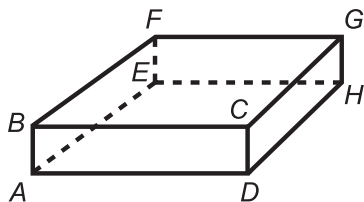
- A. \overline{AD} and \overline{BC} are perpendicular.
 B. $\overline{AC} \parallel \overline{BD}$ and $\overline{AB} \parallel \overline{CD}$.
 C. $\overline{AC} \cong \overline{BD}$ and $\overline{AB} \cong \overline{CD}$.
 D. \overline{AD} and \overline{BC} bisect each other.
37. What is the completely simplified form of the expression $\frac{12x - 3x - z^3x^2y^2}{2z^3xy^2 - 18}$?
- A. $-2x$
 B. $-\frac{9x}{16}$
 C. $-\frac{x}{2}$
 D. -1

38. Given: Prism 1 \cong Prism 2

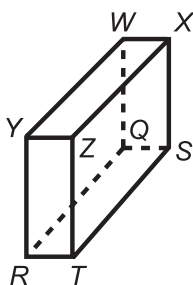
$$AB = SQ \text{ and } BC = QR$$

$$AD = 9 \text{ in}$$

$$YR = 7 \text{ in}$$



Prism 1



Prism 2

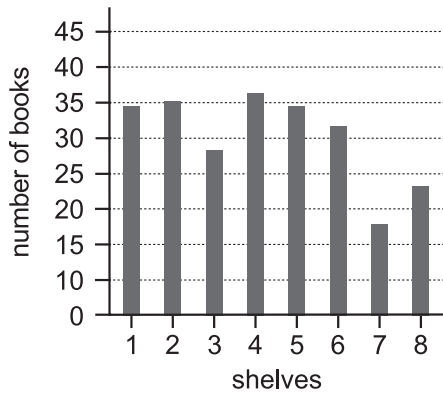
The volume of Prism 1 is 189 in^3 . What is the ratio of DH to RT ?

- A. $\frac{3}{9}$
- B. $\frac{9}{7}$
- C. $\frac{7}{3}$
- D. $\frac{9}{3}$

39. Robert sold a TV for k dollars and made a profit of p percent of the amount he paid for the TV. Which expression shows the amount Robert paid for the TV?

- A. $\frac{k(100+p)}{100}$
- B. $\frac{100k}{100+p}$
- C. $\frac{100p}{100+k}$
- D. $\frac{100k}{100-p}$

40. This graph shows the number of books on each of the 8 shelves of a bookcase.



If a librarian moves 4 books from Shelf 4 to Shelf 3, which measures related to the numbers of books per shelf will change?

- A. Median, mode, and range
- B. Mean, mode, and range
- C. Median, mean, and range
- D. Mode, median, and mean

41. Matt makes 2 promises:

1. If I get a job, I will get a new pair of jeans.
2. If I get a new pair of jeans, I will give away my old pair of jeans.

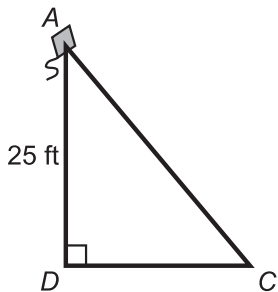
Assume Matt keeps his promises and that he does **not** give away his old pair of jeans. Which of the following is a valid conclusion?

- A. He gets a job and a new pair of jeans.
- B. He does **not** get a job and does get a new pair of jeans.
- C. He gets a job and does **not** get a new pair of jeans.
- D. He does **not** get a job and does **not** get a new pair of jeans.

42. What are the solutions to the equation $|2x + 4| = 12 - |x - 5|$?

- A. $-\frac{11}{3}$ and 3
- B. $-\frac{11}{3}$ and $\frac{13}{3}$
- C. $-\frac{11}{3}$, 3, and $\frac{13}{3}$
- D. $-\frac{13}{3}$, 13, and $\frac{13}{3}$

43. Rationalize the denominator and simplify the expression $\frac{\sqrt{y}\sqrt{x+y}}{\sqrt{xy}}$.
- A. $\frac{\sqrt{x}\sqrt{x+y}}{x}$
 B. $\frac{\sqrt{x+y}}{\sqrt{x}}$
 C. $y\sqrt{1+y}$
 D. $1 + \sqrt{y}$
44. The altitude to the hypotenuse of right triangle $\triangle ABC$ divides the hypotenuse into segments of 9 cm and 16 cm. What is the length, in centimeters, of the longer leg of $\triangle ABC$?
- A. 12
 B. 15
 C. 18
 D. 20
45. The sine of an angle in a right triangle is $\frac{2}{3}$, and the length of the hypotenuse is 37 feet. What is the tangent of this angle?
- A. $\frac{\sqrt{5}}{3}$
 B. $\frac{2\sqrt{5}}{5}$
 C. $\frac{\sqrt{5}}{2}$
 D. $\frac{3}{2}$
46. A child is standing at point C and flying a kite located at point A , 25 ft above the ground. As the child lets out more string, the kite rises to point B , directly above point A . If the angle of elevation changes from 50° to 65° , how much higher, to the nearest foot, is the kite than it was initially?



- A. 5
 B. 20
 C. 21
 D. 45

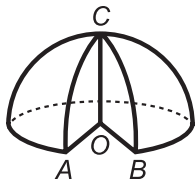
47. What are the domain and range for the relation $y = \frac{x+5}{x-5}$?

- A. The domain is the set of all real numbers.
The range is the set of all real numbers.
- B. The domain is the set of all real numbers $\neq 5$.
The range is the set of all real numbers $\neq 1$.
- C. The domain is the set of all real numbers $\neq -5$.
The range is the set of all real numbers $\neq 1$.
- D. The domain is the set of all real numbers.
The range is the set of all real numbers $\neq 5$.

48. Maria's father is 10 years younger than 3 times Maria's current age. In 5 years, his age will be 5 years more than 2 times her age. Which equation can be used to find Maria's current age?

- A. $3x - 5 = 2x + 5$
- B. $3x - 10 = 2x + 15$
- C. $3x - 10 = 2x + 10$
- D. $3x + 15 = 2x + 5$

49. A section of this hemisphere is removed, as indicated by the figure.

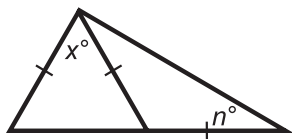


(Note: Angle $\angle AOB$ is a central angle of the great circle, and $\overline{CO} \perp \overline{AO}$.)

The radius of the hemisphere is 6 cm, and the volume of the remaining part of the hemisphere is $120\pi \text{ cm}^3$. What is $m\angle AOB$?

- A. 60°
- B. 90°
- C. 210°
- D. 300°

50. What is the value of n in terms of x ?



- A. $45 + \frac{1}{4}x$
- B. $45 - \frac{1}{4}x$
- C. $90 + \frac{1}{2}x$
- D. $90 - \frac{1}{2}x$

International Subject Test— Math 1 Practice Test

Answer Key

The following table contains the question number and the correct answer (Key) for each question in this pdf file.

1	C
2	D
3	C
4	C
5	D
6	C
7	D
8	D
9	C
10	B
11	C
12	C
13	D
14	D
15	D
16	D
17	A
18	C
19	C
20	A
21	B
22	D
23	C
24	A
25	B

26	B
27	A
28	A
29	C
30	A
31	A
32	D
33	B
34	D
35	B
36	A
37	C
38	C
39	B
40	A
41	D
42	A
43	A
44	D
45	B
46	B
47	B
48	C
49	A
50	B