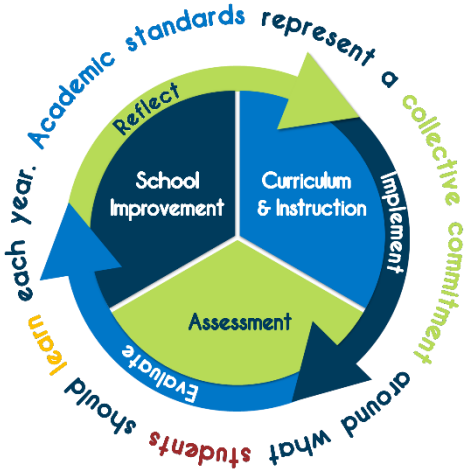
ILLINOIS STATE BOARD OF EDUCATION

MATHEMATICS HIGH SCHOOL GEOMETRY

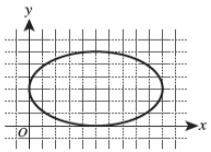
Samples to Success

Sample items provide valuable insight into how students engage with different texts, tasks, and contexts by highlighting the types of opportunities they need for success in the classroom. These items offer a shared reference point for understanding proficiency expectations, complementing the assessment's role in measuring learning. Analyzing items alongside performance data can enable educators to gain a deeper understanding of students' strengths and areas for growth. Students thrive in environments rich with diverse materials, challenges that vary in task type, and multiple avenues for demonstrating understanding. High-quality instruction, aligned with the learning goals, is the most effective way to support students' growth and prepare them for success.



The sample questions included in this rubric are a blend of those typical of the ACT and others that are suitable for classroom instruction, aimed at reinforcing and developing the skills assessed on the ACT. The geometry content includes asking students to define and apply knowledge of shapes and solids, such as congruence and similarity relationships or surface area and volume measurements. Students must understand the composition of objects, and solve for missing values in triangles, circles, and other figures, including using trigonometric ratios and equations of conic sections. This document contains ACT items and includes excerpts from ACT alignment guides: © ACT Education Corp.

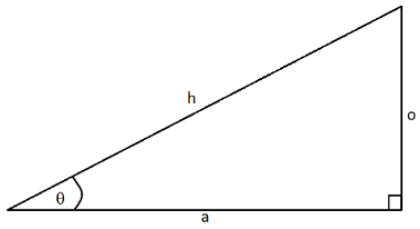
Geometry

Below Proficient	Approaching Proficient	Proficient	Above Proficient
In the standard (x, y) coordinate plane, point A has coordinates (-7, -5). Point A is translated 7 units to the left and 5 units down, and the image is labeled A'. What are the coordinates of A'? A. (-14, -10) B. (-12, -12) C. (-7, -10) D. (0,0) E. (14,10)	In the standard (x, y) coordinate plane, what is the midpoint of the line segment that has endpoints (3,8) and (1, -4)? A. (-2, -12) B. (-1, -6) C. $(\frac{11}{2}, -\frac{3}{2})$ D. (2,2) E. (4, -12)	In the standard (x,y) coordinate plane, the point (2,1) is the midpoint of $\overline{CD}$. Point C has coordinates (6,8). What are the coordinates of point D? A. $(-2, -\frac{7}{2})$ B. (-2, -6) C. $(4, \frac{9}{2})$ D. (10,10) E. (10,15)	The ellipse in the standard (x, y) coordinate plane below is the graph of $\frac{(x-5)^2}{25} + \frac{(y-3)^2}{9} = 1$. Which of the following points are the foci of the ellipse?  A. (0,3) and (5.3) B. (0,3) and (10,3) C. (1,3) and (5,0) D. (1,3) and (9,3) E. (5,0) and (5,6)

Geometry

Below Proficient

If o $= 10\ ft$ and a $= 17\ ft$, how long is side h?



A. 17.9 ft

B. Not enough information to solve.

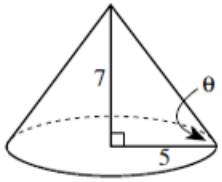
C. 19.3 ft

D. 19.7 ft

E. 18 ft

Approaching Proficient

The radius of the base of the right circular cone shown below is 5 inches, and the height of the cone is 7 inches. Solving which of the following equations gives the measure, θ, of the angle formed by a slant height of the cone and a radius?



A. $\tan\theta = \frac{5}{7}$

B. $\tan\theta = \frac{7}{5}$

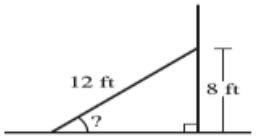
C. $\sin\theta = \frac{5}{7}$

D. $\sin\theta = \frac{7}{5}$

E. $\cos\theta = \frac{7}{5}$

Proficient

A 12-foot taut wire has one end attached to the ground and the other end attached to a vertical pole, as shown below. The point of contact of the wire and the pole is 9 feet above the ground. What angle does the wire make with the level ground?



A. $\cos^{-1}(\frac{8}{12})$

B. $\csc^{-1}(\frac{8}{12})$

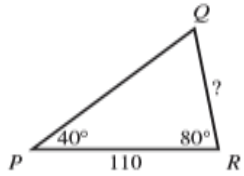
C. $\sec^{-1}(\frac{8}{12})$

D. $\sin^{-1}(\frac{8}{12})$

E. $\tan^{-1}(\frac{8}{12})$

Above Proficient

In ΔPQR shown below, the measure of $\angle P$ is 40°. PR = 110 meters, and the measure of $\angle R$ is 80°. Which of the following expressions gives QR, in meters?



(Note: For triangle with sides of length a, b, and c that are opposite angles $\angle A$, $\angle B$, $\angle$C, respectively, $\frac{\sin\angle A}{a} = \frac{\sin\angle B}{b} = \frac{\sin\angle C}{c}$.)

A. $\frac{110\sin 40°}{\sin 60°}$

B. $\frac{110\sin 40°}{\sin 80°}$

C. $\frac{110\sin 60°}{\sin 40°}$

D. $\frac{110\sin 80°}{\sin 40°}$

E. $\frac{110\sin 80°}{\sin 60°}$

Geometry

Below Proficient

The perimeter of a regular pentagon is 85. What is the length of one side?

A. 8.5

B. $15\sqrt{3}$

C. $14\sqrt{7}$

D. $15\sqrt{6}$

E. 17

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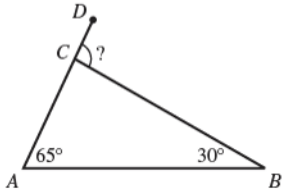
Approaching Proficient

In the figure below, point C is on $\overline{AD}$, and 2 angle measures of ΔABC are given. What is the measure of $\angle BCD$?



A. 65°

B. 85°

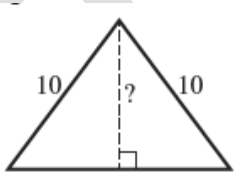
C. 95°

D. 105°

E. 115°

Proficient

The isosceles triangle shown below has congruent legs that are each 10 centimeters long. The perimeter of the triangle is 32 centimeters. What is the length, in centimeters, of the altitude that splits the triangle into 2 congruent right triangles?



A. $\sqrt{44}$

B. 6

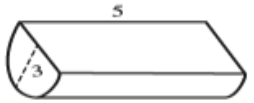
C. 7

D. 8

E 10

Above Proficient

The right semicircular cylinder shown below has a height of 5 centimeters and a semicircular base of radius 3 centimeters. What is the volume, in cubic centimeters, of the right semicircular cylinder?



A. $\frac{45}{4}\pi$

B. $\frac{45}{2}\pi$

C. $\frac{75}{2}\pi$

D. 15π

E. 45π