Tennessee Comprehensive Assessment Program

TCAP

Math EOC Item Release
Geometry

2018–2019

TN Department of **Education**

Item Information

Item Code:	TN239421	Grade Level:	Geometry
Standard Code:	G.CO.A.2	Position No:	1

Standard Text: Represent transformations in the plane in multiple ways, including technology. Describe transformations as functions that take points in the plane (pre-image) as inputs and give other points (image) as outputs. Compare transformations that preserve distance and angle measure to those that do not (e.g., translation versus horizontal stretch).

Reporting Category: 1: Congruence

Calculator: Z

Correct Answer:	B	DOK Level:	2	Item Type:	O

Triangle ABC has vertices $A(-3, 3)$, $B(2, 4)$, and $C(-2, 2)$ and is translated according to the rule $(x, y) \rightarrow (x + 2, y - 4)$.

What are the coordinates of the vertices of the translated figure?

A. $A'(-7, 5)$, $B'(-2, 6)$, and $C'(-6, 4)$

B. $A'(-1, -1)$, $B'(4, 0)$, and $C'(0, -2)$

C. $A'(-5, 7)$, $B'(0, 8)$, and $C'(-4, 6)$

D. $A'(-1, -1)$, $B'(6, -2)$, and $C'(4, -6)$

Item Information

Item Code:	TN710213	Grade Level:	Geometry
Standard Code:	G.CO.A.5	Position No:	2

Standard Text: Given a geometric figure and a rigid motion, draw the image of the figure in multiple ways, including technology. Specify a sequence of rigid motions that will carry a given figure onto another.
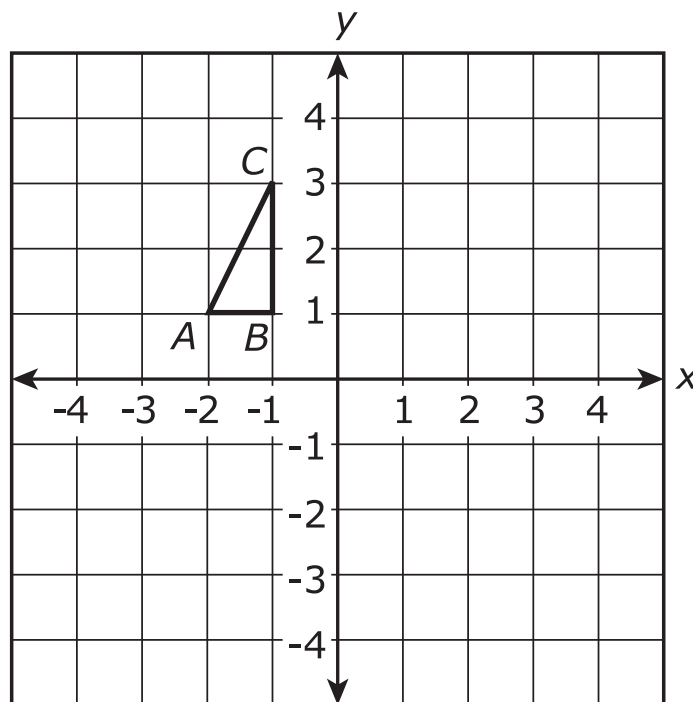
Reporting Category: 1: Congruence

Calculator: Z

Correct Answer:	C	DOK Level: 2	Item Type: O

$\triangle ABC$ is rotated 180° counter clockwise about the origin to produce $\triangle A'B'C'$.

What are the coordinates of $\triangle A'B'C'$?

A. $A'(2, 1)$, $B'(1, 1)$, and $C'(1, 3)$

B. $A'(-2, 1)$, $B'(-1, 1)$, and $C'(1, -3)$

C. $A'(2, -1)$, $B'(1, -1)$, and $C'(1, -3)$

D. $A'(-1, -2)$, $B'(-1, -1)$, and $C'(-3, -1)$

Item Information

Item Code:	TN910140	Grade Level:	Geometry
Standard Code:	G.CO.B.6	Position No:	3

Standard Text: Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to determine informally if they are congruent.

Reporting Category: 1: Congruence

Calculator: Z

Correct Answer:	B,E	DOK Level: 2		Item Type: O

Consider the line segment defined by the points $A(0, 1)$ and $B(4, 6)$. How does a reflection across the x-axis affect $\overline{AB}$?

Select **all** that apply.

A. The x-values of the reflection are the opposite values of the x-values of the original segment.

B. The y-values of the endpoints become their opposites.

C. The length of the reflection of $\overline{AB}$ is greater than the length of $\overline{AB}$.

D. The length of the reflection of $\overline{AB}$ is less than the length of $\overline{AB}$.

E. The length of the reflection of $\overline{AB}$ is the same as the length of $\overline{AB}$.

Item Information

Item Code: TN710390

Grade Level: Geometry

Standard Code: G.CO.B.7

Position No: 4

Standard Text: Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
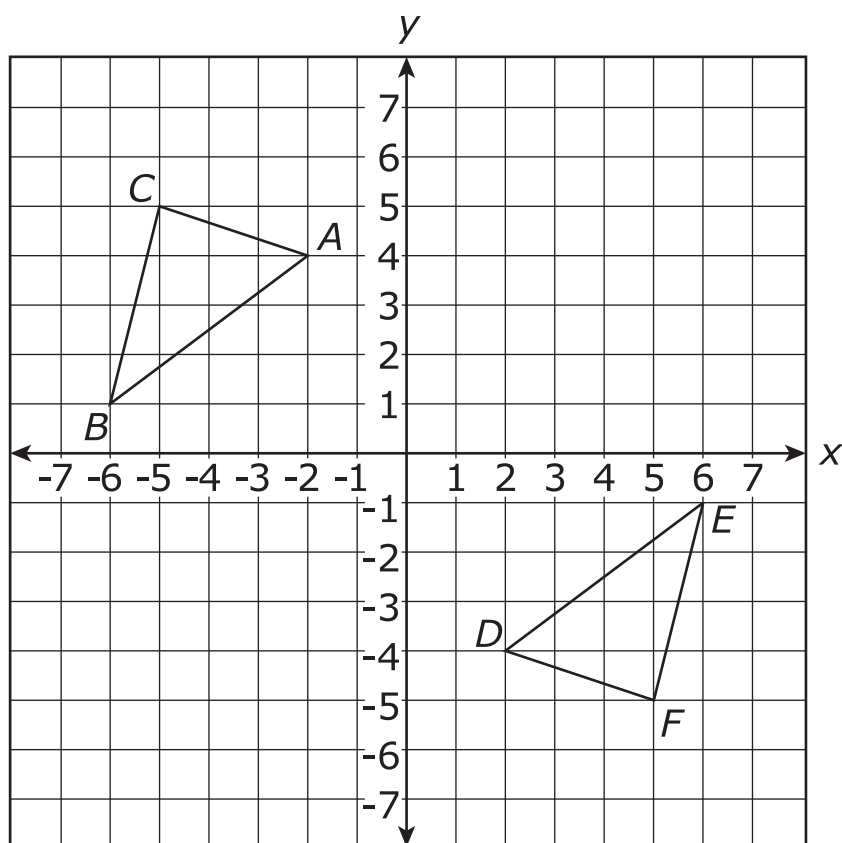
Reporting Category: 1: Congruence

Calculator: Z

Correct Answer: D

DOK Level: 2

Item Type: O

Which transformation proves $\triangle ABC \cong \triangle DEF$?

A. reflection of $\triangle ABC$ over the line $y = x$

B. translation of $\triangle ABC$ 7 units right and 9 units down

C. rotation of $\triangle ABC$ 90° clockwise, centered at the origin

D. reflection of $\triangle ABC$ over the y-axis and then over the x-axis

Item Information

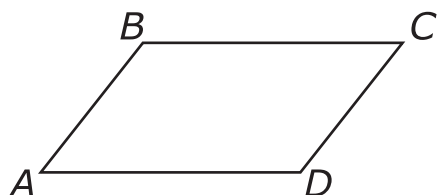|			
Item Code:	TN441970	Grade Level:	Geometry
Standard Code:	G.CO.C.11	Position No:	5
Standard Text:	Prove theorems about parallelograms.		
Reporting Category:	1: Congruence		
Calculator:	Z		
Correct Answer:	A,D,E	DOK Level: 2	Item Type: O

A partial proof that the opposite angles of a parallelogram are congruent is shown.

Given: Quadrilateral *ABCD* is a parallelogram
Prove: ∠A ≅ ∠C

Statements	Reasons
1. Quadrilateral *ABCD* is a parallelogram	1. Given
2. $\overline{BC}\|\overline{AD}$, $\overline{AB}\|\overline{DC}$	2.
3. ∠A and ∠B are supplementary; ∠B and ∠C are supplementary	3.
4. ∠A and ∠C are congruent	4.

(This item continues on the next page.)

*(**Item 5**, continued from the previous page)*

Which reasons are missing from the proof?

Select **all** that apply.

A. Definition of parallelogram

B. Definition of parallel lines

C. When parallel lines are cut by a transversal, corresponding angles are congruent.

D. When parallel lines are cut by a transversal, consecutive interior angles are supplementary.

E. Angles supplementary to the same angle are congruent to each other.

F. Angles supplementary to the same angle are supplementary to each other.

Item Information

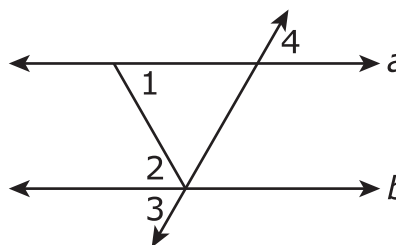|	
Item Code: TN841784	Grade Level: Geometry
Standard Code: G.CO.C.9	Position No: 6
Standard Text: Prove theorems about lines and angles.	
Reporting Category: 1: Congruence	
Calculator: Z	
Correct Answer: C	DOK Level: 2	Item Type: O

The steps of a proof are shown.

Given: $a \| b$, $\angle 1 \cong \angle 4$
Prove: $\angle 2 \cong \angle 3$

Steps
1. $a \| b$, $\angle 1 \cong \angle 4$
2. $\angle 1 \cong \angle 2$
3. $\angle 2 \cong \angle 4$
4. $\angle 4 \cong \angle 3$
5. $\angle 2 \cong \angle 3$

What is the reason for Step 4?

A. Given

B. Alternate Interior Angle Theorem

C. Alternate Exterior Angle Theorem

D. Transitive Property of Congruence

In the circle shown, $\overline{AB}$ is tangent to circle O at point C and $\overline{OC}$ is a radius.

Which relationship is true?

A. $\angle COB \cong \angle CBO$

B. $\angle COB \cong \angle ACO$

C. $\overline{OB} \perp \overline{OC}$

D. $\overline{OC} \perp \overline{AB}$

Item Information

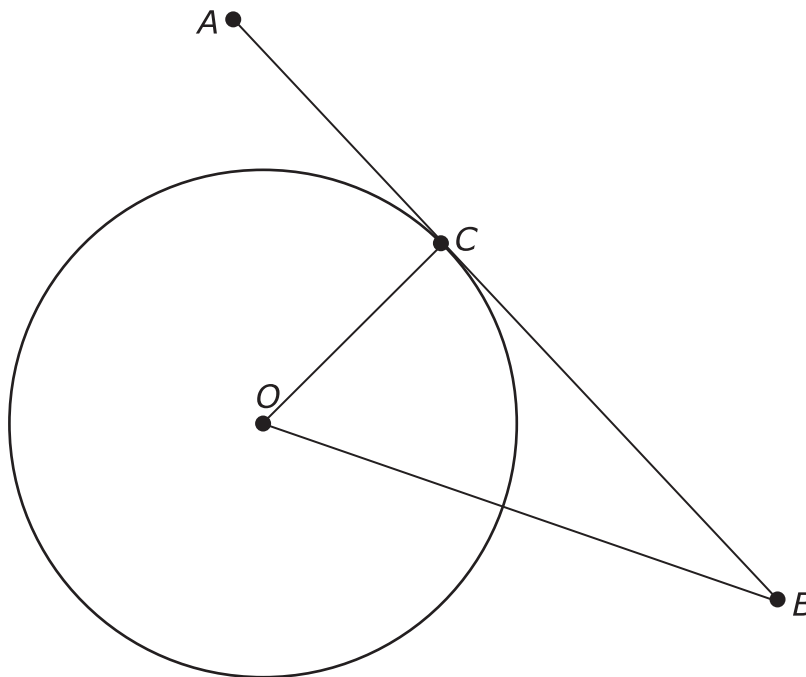|			
Item Code:	TN810446	Grade Level:	Geometry
Standard Code:	G.C.A.2	Position No:	8
Standard Text:	Identify and describe relationships among inscribed angles, radii, and chords.		
Reporting Category:	2: Triangles and Circles		
Calculator:	Z		
Correct Answer:	A	DOK Level: 1	Item Type: O

Which statement about angles of a circle is true?

A. An angle inscribed in a semicircle is a right angle.

B. A central angle has one half the measure of the arc it subtends.

C. An inscribed angle has the same measure as the arc it subtends.

D. An inscribed angle in which one of the sides is a diameter is obtuse.

Geometry

Item Information

Item Code: TN845778　　　　　　　　　　Grade Level: Geometry

Standard Code: G.GPE.A.1　　　　　　　　Position No: 9

Standard Text: Know and write the equation of a circle of given center and radius using the Pythagorean Theorem.

Reporting Category: 2: Triangles and Circles

Calculator: Z

Correct Answer: D　　　　DOK Level: 2　　　　Item Type: O

Jamal is asked to draw a circle. He is given the center and two points on the circle, but he isn't told which point is which. The points are $(-4, 7)$, $(3, 6)$, and $(-1, 3)$. Jamal draws the accurate circle from this information.

What is the equation of the circle he draws?

A. $(x + 4)^2 + (y - 7)^2 = 50$

B. $(x - 3)^2 + (y - 6)^2 = 50$

C. $(x - 3)^2 + (y - 6)^2 = 25$

D. $(x + 1)^2 + (y - 3)^2 = 25$

Item Information

Item Code: TN543001	Grade Level: Geometry
Standard Code: G.SRT.A.1	Position No: 10

Standard Text: Verify informally the properties of dilations given by a center and a scale factor.

Reporting Category: 2: Triangles and Circles

Calculator: Z

Correct Answer: A,D,F	DOK Level: 2	Item Type: O

On a coordinate plane, consider the transformation of dilating a line by a factor of 3, with the point $(0, 8)$ as the center of dilation. Which line remains unchanged under the transformation?

Select **all** that apply.

A. The line $y = -3x + 8$

B. The line $y = 3(x - 8)$

C. The line $y = 3(x + 8)$

D. The line $y = 3x + 8$

E. The line $y = 4(x - 8)$

F. The line $y = 4x + 8$

Item Information

Item Code:	TN943007	Grade Level:	Geometry
Standard Code:	G.SRT.A.1	Position No:	11
Standard Text:	Verify informally the properties of dilations given by a center and a scale factor.		
Reporting Category:	2: Triangles and Circles		
Calculator:	Z		
Correct Answer:	A	DOK Level: 2	Item Type: O

On a coordinate plane, the segment with endpoints $(10, 40)$ and $(70, 120)$ is dilated by a factor of $\frac{4}{5}$, with the origin as the center of dilation. What is the length of the resulting segment?

A. 80

B. 100

C. 112

D. 125

Item Information

|	
Item Code:	TN341656
Standard Code:	G.SRT.A.2
Standard Text:	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
Reporting Category:	2: Triangles and Circles
Calculator:	Z
Correct Answer:	B

Grade Level: Geometry

Position No: 12

DOK Level: 2   Item Type: O

What sequence of transformations can be used to prove that △ABC ~ △DEF?
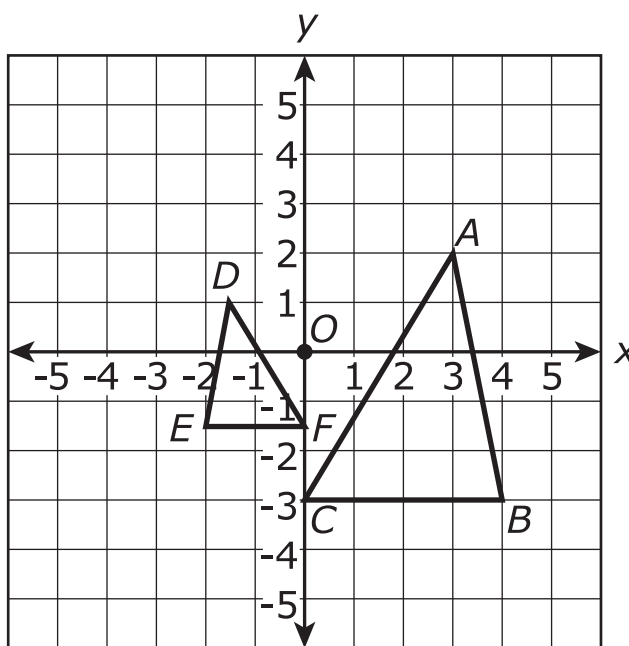
(This item continues on the next page.)

*(**Item 12**, continued from the previous page)*

A. Dilate $\triangle ABC$ with respect to the origin using a scale factor of $\frac{1}{3}$. Then reflect the result over the *y*-axis.

B. Dilate $\triangle ABC$ with respect to the origin using a scale factor of $\frac{1}{2}$. Then reflect the result over the *y*-axis.

C. Dilate $\triangle ABC$ with respect to the origin using a scale factor of $\frac{1}{3}$. Then reflect the result over the *x*-axis.

D. Dilate $\triangle ABC$ with respect to the origin using a scale factor of $\frac{1}{2}$. Then reflect the result over the *x*-axis.

Item Information

Item Code:	TN543078	Grade Level:	Geometry
Standard Code:	G.SRT.A.2	Position No:	13

Standard Text: Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

Reporting Category: 2: Triangles and Circles

Calculator: Z

Correct Answer: D   DOK Level: 2   Item Type: O

On a coordinate plane, $\triangle ABC$ has vertices at $A\,(10, 5)$, $B\,(10, 15)$, and $C\,(5, 5)$. $\triangle A'B'C'$ has vertices at $A'\,(30, 12)$, $B'\,(30, 52)$, and $C'\,(10, 12)$. Which transformation maps $\triangle ABC$ onto $\triangle A'B'C'$?

A. $(x, y) \rightarrow (3x, 3y + 3)$

B. $(x, y) \rightarrow (3x, 3y - 3)$

C. $(x, y) \rightarrow (4x + 10, 4y + 8)$

D. $(x, y) \rightarrow (4x - 10, 4y - 8)$

Item Information

Item Code: TN044272	Grade Level: Geometry
Standard Code: G.SRT.A.3	Position No: 14

Standard Text: Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.

Reporting Category: 2: Triangles and Circles
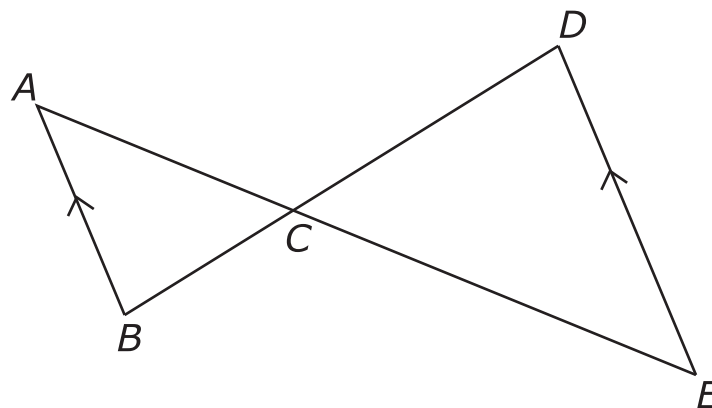
Calculator: Z

Correct Answer: B,C,D   DOK Level: 3   Item Type: O

In the diagram shown, $\overline{AB} \parallel \overline{DE}$ and C is on both $\overline{AE}$ and BD.

Which of these statements must be true?

Select **all** that apply.

A. $\angle A \cong \angle D$ and $\angle B \cong \angle E$

B. $\triangle ABC \sim \triangle EDC$

C. Dilation by a factor of $\dfrac{EC}{AC}$ centered at point C followed by a rotation of $180°$ about point C, maps $\triangle ABC$ to $\triangle EDC$.

D. Rotation $180°$ about point C followed by a dilation by a factor of $\dfrac{EC}{AC}$ centered at point C, maps $\triangle ABC$ to $\triangle EDC$.

E. Dilation by a factor of $\dfrac{EC}{AC}$ centered at point C followed by a reflection across the line through C parallel to $\overline{AB}$, maps $\triangle ABC$ to $\triangle EDC$.

Item Information

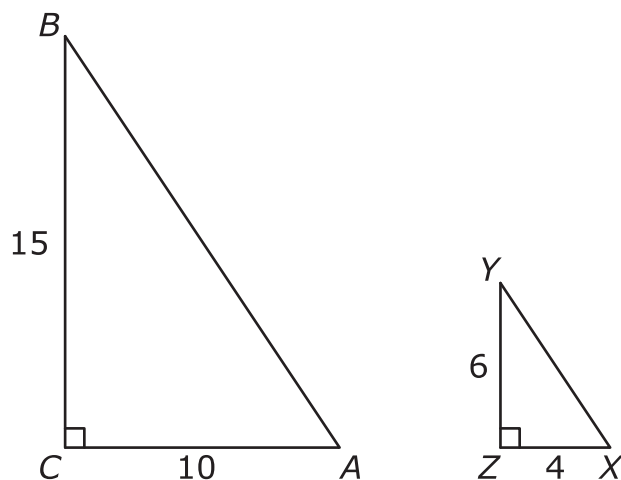|			
Item Code:	TN344316	Grade Level:	Geometry
Standard Code:	G.SRT.B.4	Position No:	15
Standard Text:	Prove theorems about similar triangles.		
Reporting Category:	2: Triangles and Circles		
Calculator:	Z		
Correct Answer:	B	DOK Level: 2	Item Type: O

△*ABC* and △*XYZ* are both right triangles.

Statements	Reasons
1. *AC* = 10, *BC* = 15, *XZ* = 4, *YZ* = 6	1. Given
2. ?	2. ?
3. ∠*ACB* and ∠*XZY* are right angles	3. Given
4. ∠*ACB* ≅ ∠*XZY*	4. All right angles are congruent.
5. △*ABC* ~ △*XYZ*	5. SAS

*(**Item 15**, continued from the previous page)*

Which statement and reason are missing from the proof to prove $\triangle ABC \sim \triangle XYZ$?

A. $AC = XZ$ and $BC = YZ$ since the lengths of the corresponding sides are equal.

B. $\dfrac{AC}{XZ} = \dfrac{BC}{YZ}$ since the lengths of the corresponding sides are proportional.

C. $AB = XY$ since the lengths of the hypotenuses are equal.

D. $\dfrac{AC}{XZ} = \dfrac{YZ}{BC}$ since the lengths of the corresponding sides are proportional.

Item Information

Item Code:	TN444396	Grade Level:	Geometry
Standard Code:	G.SRT.B.4	Position No:	16
Standard Text:	Prove theorems about similar triangles.		
Reporting Category:	2: Triangles and Circles		
Calculator:	Z		
Correct Answer:	D	DOK Level: 3	Item Type: O

The following statements describe triangles ABC and PQR.

For $\triangle ABC : AC = 2, AB = 4,$ and $BC = 5.$
For $\triangle PQR : QR = 7.5, PR = 3,$ and $PQ = 6.$

Which statement explains why $\triangle ABC$ and $\triangle PQR$ are either similar or not similar?

A. $\triangle ABC$ and $\triangle PQR$ are not similar because $\dfrac{AC}{QR} \neq \dfrac{AB}{PR}.$

B. $\triangle ABC$ and $\triangle PQR$ are similar because $\dfrac{AC}{PR} = \dfrac{PQ}{AB} = \dfrac{BC}{QR}.$

C. $\triangle ABC$ and $\triangle PQR$ are similar because $\dfrac{AB}{PQ} = \dfrac{BC}{QR}.$

D. $\triangle ABC$ and $\triangle PQR$ are similar because $\dfrac{AC}{PR} = \dfrac{BC}{QR} = \dfrac{AB}{PQ}.$

Item Information

|			
Item Code:	TN144443	Grade Level:	Geometry
Standard Code:	G.SRT.C.8.a	Position No:	17
Standard Text:	Know and use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.		
Reporting Category:	2: Triangles and Circles		
Calculator:	Z		
Correct Answer:	C	DOK Level: 2	Item Type: O

Lorenzo is 6 feet, 3 inches in height. He looks at his shadow when the angle of elevation of the sun is 35°.
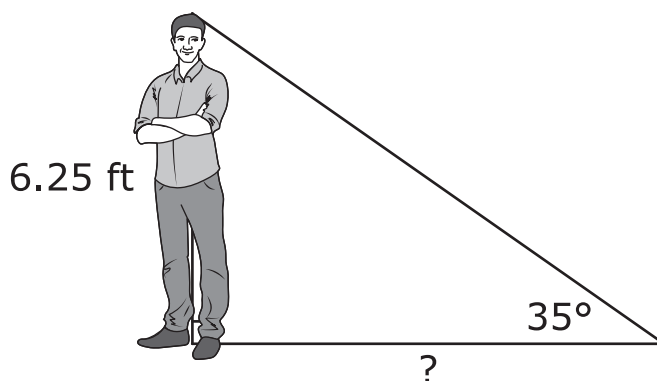
What is the approximate length of his shadow?

A. 4 feet, 5 inches

B. 7 feet, 7 inches

C. 8 feet, 11 inches

D. 10 feet, 11 inches

Item Information

Item Code:	TN844507	Grade Level:	Geometry
Standard Code:	G.SRT.C.8.b	Position No:	18

Standard Text: Know and use the Law of Sines and Law of Cosines to solve problems in real life situations. Recognize when it is appropriate to use each.

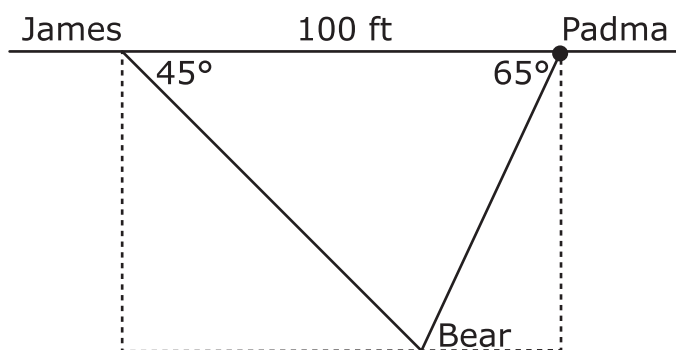Reporting Category: 2: Triangles and Circles

Calculator: Z

Correct Answer: B	DOK Level: 2	Item Type: O	

James and Padma are on opposite sides of a 100-ft-wide canyon. James sees a bear at an angle of depression of 45°. Padma sees the same bear at an angle of depression of 65°.

What is the approximate distance, in feet, between Padma and the bear?

A. 21.2 ft

B. 75.2 ft

C. 96.4 ft

D. 171.6 ft

Item Information

Item Code:	TN544274	Grade Level:	Geometry
Standard Code:	G.GPE.B.2	Position No:	19
Standard Text:	Use coordinates to prove simple geometric theorems algebraically.		
Reporting Category:	3: Geometric Proofs and Solving Design Problems		
Calculator:	Z		
Correct Answer:	A,D,E	DOK Level: 3	Item Type: O

On a coordinate plane, $\triangle ABC$ has vertices at $A(3, 6)$, $B(12, 6)$, and $C(12, 1)$. Which statements are true?

Select **all** that apply.

A. $\triangle ABC$ is a right triangle.

B. $\triangle ABC$ is an equilateral triangle.

C. $\triangle ABC$ is an isosceles triangle.

D. $\triangle ABC$ is a scalene triangle.

E. $\angle A$ and $\angle C$ are complementary.

F. $\angle A$ and $\angle C$ are supplementary.

Item Information

Item Code: TN162390	Grade Level: Geometry
Standard Code: G.GPE.B.5	Position No: 20

Standard Text: Know and use coordinates to compute perimeters of polygons and areas of triangles and rectangles.

Reporting Category: 3: Geometric Proofs and Solving Design Problems
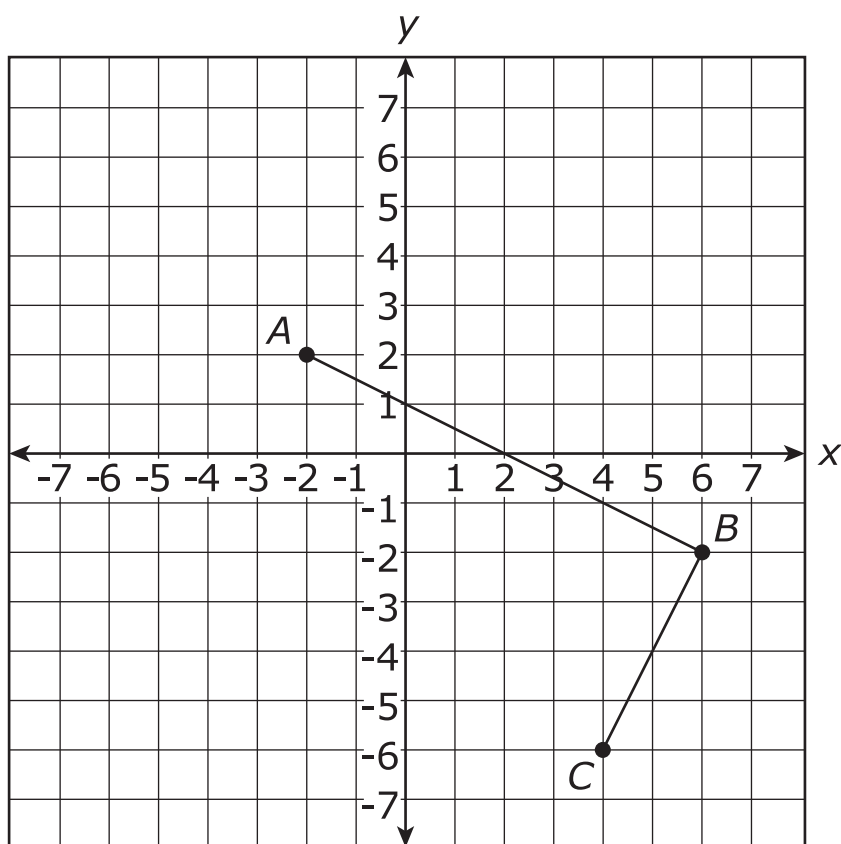
Calculator: Z

Correct Answer: A,C,D,E   DOK Level: 2   Item Type: O

Three points of rectangle *ABCD* are shown on a coordinate plane.

Which statement is true? Select **all** that apply.

A. The coordinates of *D* are $(-4, -2)$.

B. The perimeter of rectangle *ABCD* is about 13.41 units.

C. The length of $\overline{CD}$ is about 8.94 units.

D. The area of the rectangle is about 40 square units.

E. The length of $\overline{AD}$ is about 4.47 units.

Triangle *ABC* is shown on a coordinate plane.
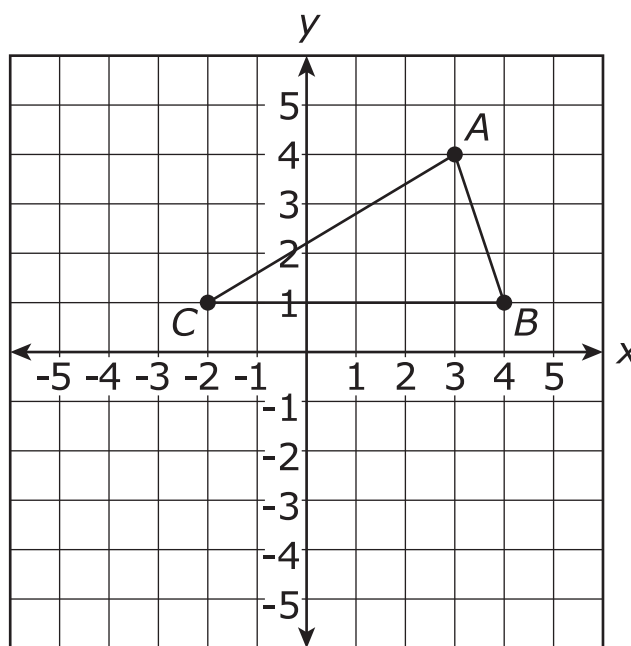
Which statement is true?

Select **all** that apply.

A. If $\overline{AD}$ is the altitude from *A* to $\overline{BC}$, the coordinates of *D* are (1, 3).

B. The perimeter of △*ABC* is about 15 units.

C. The length of the longest side of the triangle is about 5.83 units.

D. The area of the triangle is 9 square units.

E. The length of the shortest side of the triangle is about 3.16 units.

Item Information

Item Code: TN842856   Grade Level: Geometry

Standard Code: G.GMD.A.1   Position No: 22

Standard Text: Give an informal argument for the formulas for the circumference of a circle and the volume and surface area of a cylinder, cone, prism, and pyramid.

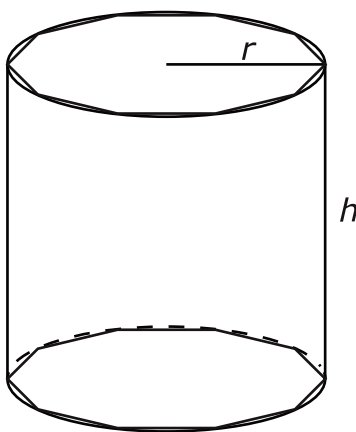Reporting Category: 4: Two and Three Dimensional Geometry

Calculator: Z

Correct Answer: A,C,D   DOK Level: 2   Item Type: O

A right circular cylinder has radius r and height h. Two regular polygons with n sides are inscribed in the circular bases, and then joined to form a right prism.

Let A_n represent the area of a regular polygon with n sides. Which statements can be used to justify the formula for the volume of a cylinder?

Select **all** that apply.

A. As n increases, A_n approaches πr^2.

B. As n increases, A_n approaches $2\pi r$.

C. The volume of the prism is given by A_n times the height.

D. As n increases, the volume of the prism approaches $\pi r^2 h$.

E. As n increases, the volume of the prism approaches $2\pi r^2 h$.

Item Information

Item Code: TN542946	Grade Level: Geometry
Standard Code: G.GMD.A.2	Position No: 23

Standard Text: Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.

Reporting Category: 4: Two and Three Dimensional Geometry

Calculator: Z

Correct Answer: A	DOK Level: 2	Item Type: O

A fish tank in the shape of a rectangular prism holds 30 cubic feet of water. The tank has a length of 5 feet and a width of 3 feet. What is the depth, in feet, of the tank?

A.   2

B.   6

C.   10

D.   15

Item Information

Item Code:	TN839361	Grade Level:	Geometry
Standard Code:	G.GMD.A.2	Position No:	24

Standard Text: Know and use volume and surface area formulas for cylinders, cones, prisms, pyramids, and spheres to solve problems.

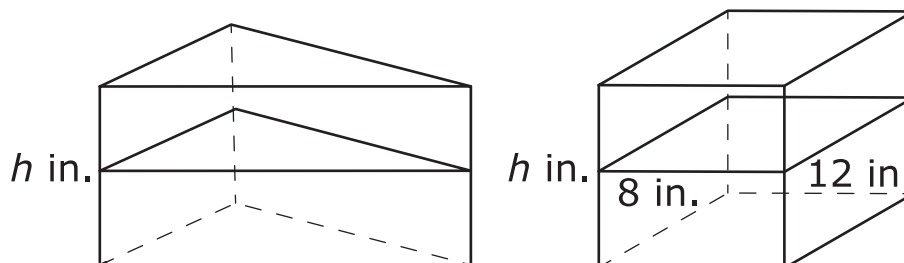Reporting Category: 4: Two and Three Dimensional Geometry

Calculator: Z

Correct Answer:	D	DOK Level:	2	Item Type:	O

A right triangular prism and a rectangular prism are shown. Each prism has a height of h inches and a cross-section that is parallel to its base. The length and width of the rectangular cross-section given.

If the volumes of the two solids are equal, which pair of measurements are possible lengths of the legs of the right-triangular cross-section?

A. 4 in. and 6 in.

B. 6 in. and 8 in.

C. 8 in. and 12 in.

D. 12 in. and 16 in.

Geometry to Integrated Math Courses Standard Crosswalk

The Tennessee Academic Standards for Mathematics are grouped by conceptual category — not by course — to allow for two approaches. The traditional approach consists of three courses: Algebra I, Geometry, and Algebra II. The integrated approach also consists of three courses: Integrated Math I, Integrated Math II, and Integrated Math III. Both pathways include the same content standards. Across the three courses, students in the traditional pathway will study the same content as students in the integrated pathway. The two pathways will provide the same entry point and the same exit point in the content standards. Because of limitations in the item bank for integrated pathway courses, only operational items from the traditional pathway assessments can be publicly released at this time. In order to provide assessment resources applicable to both pathways, the released items from traditional pathway assessments have been linked to standards in the integrated pathways. The table below lists the released items from the designated traditional pathway course, the standards they assess in that course, and the corresponding standards in the integrated pathway courses.

Geometry To Integrated Math Courses			
Sequence	Item Code	Geometry Standard	Int Math Standard
1	TN239421	G.CO.A.2	M1.G.CO.A.2
2	TN710213	G.CO.A.5	M1.G.CO.A.5
3	TN910140	G.CO.B.6	M1.G.CO.B.6
4	TN710390	G.CO.B.7	M1.G.CO.B.7
5	TN441970	G.CO.C.11	M1.G.CO.C.11
6	TN841784	G.CO.C.9	M1.G.CO.C.9
7	TN110412	G.C.A.2	M3.G.C.A.2
8	TN810446	G.C.A.2	M3.G.C.A.2
9	TN845778	G.GPE.A.1	M3.G.GPE.A.1
10	TN543001	G.SRT.A.1	M2.G.SRT.A.1
11	TN943007	G.SRT.A.1	M2.G.SRT.A.1
12	TN341656	G.SRT.A.2	M2.G.SRT.A.2
13	TN543078	G.SRT.A.2	M2.G.SRT.A.2
14	TN044272	G.SRT.A.3	M2.G.SRT.A.3
15	TN344316	G.SRT.B.4	M2.G.SRT.B.4
16	TN444396	G.SRT.B.4	M2.G.SRT.B.4
17	TN144443	G.SRT.C.8.a	M2.G.SRT.C.8a
18	TN844507	G.SRT.C.8.b	M2.G.SRT.C.8b
19	TN544274	G.GPE.B.2	M3.G.GPE.B.2
20	TN162390	G.GPE.B.5	M3.G.GPE.B.5
21	TN262363	G.GPE.B.5	M3.G.GPE.B.5
22	TN842856	G.GMD.A.1	M2.G.GMD.A.1
23	TN542946	G.GMD.A.2	M2.G.GMD.A.2
24	TN839361	G.GMD.A.2	M2.G.GMD.A.2