

Triangle Congruence/Transformations

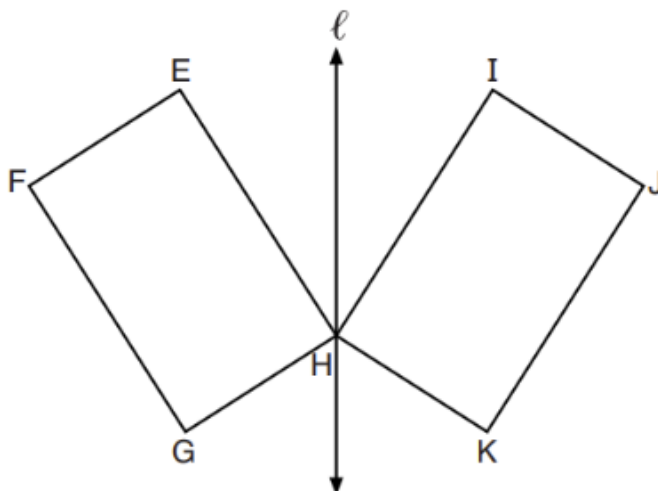
January 2024 #22

Triangles YEG and POM are two distinct non-right triangles such that $\angle G \cong \angle M$. Which statement is sufficient to prove $\triangle YEG$ is always congruent to $\triangle POM$?

- (1) $\angle E \cong \angle O$ and $\angle Y \cong \angle P$
- (2) $\overline{YG} \cong \overline{PM}$ and $\overline{YE} \cong \overline{PO}$
- (3) There is a sequence of rigid motions that maps $\angle E$ onto $\angle O$ and \overline{YE} onto \overline{PO} .
- (4) There is a sequence of rigid motions that maps point Y onto point P and \overline{YG} onto \overline{PM} .

June 2022 #28

In the diagram below, parallelogram $EFGH$ is mapped onto parallelogram $IJKH$ after a reflection over line ℓ .



Use the properties of rigid motions to explain why parallelogram $EFGH$ is congruent to parallelogram $IJKH$.

June 2022 #10

Which transformation does *not* always preserve distance?

(1) $(x,y) \rightarrow (x + 2, y)$

(3) $(x,y) \rightarrow (2x, y - 1)$

(2) $(x,y) \rightarrow (-y, -x)$

(4) $(x,y) \rightarrow (3 - x, 2 - y)$

August 2023 #17

What is the image of $(4,3)$ after a reflection over the line $y = 1$?

(1) $(-2,3)$

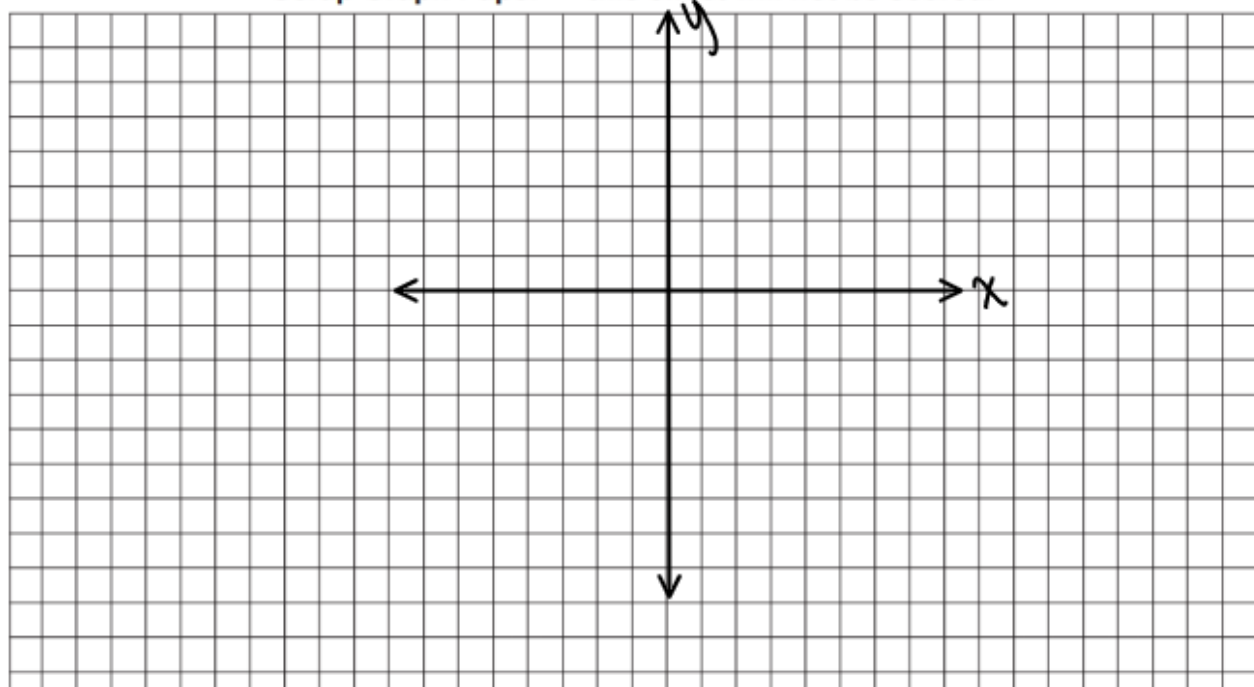
(3) $(4,-1)$

(2) $(-4,3)$

(4) $(4,-3)$

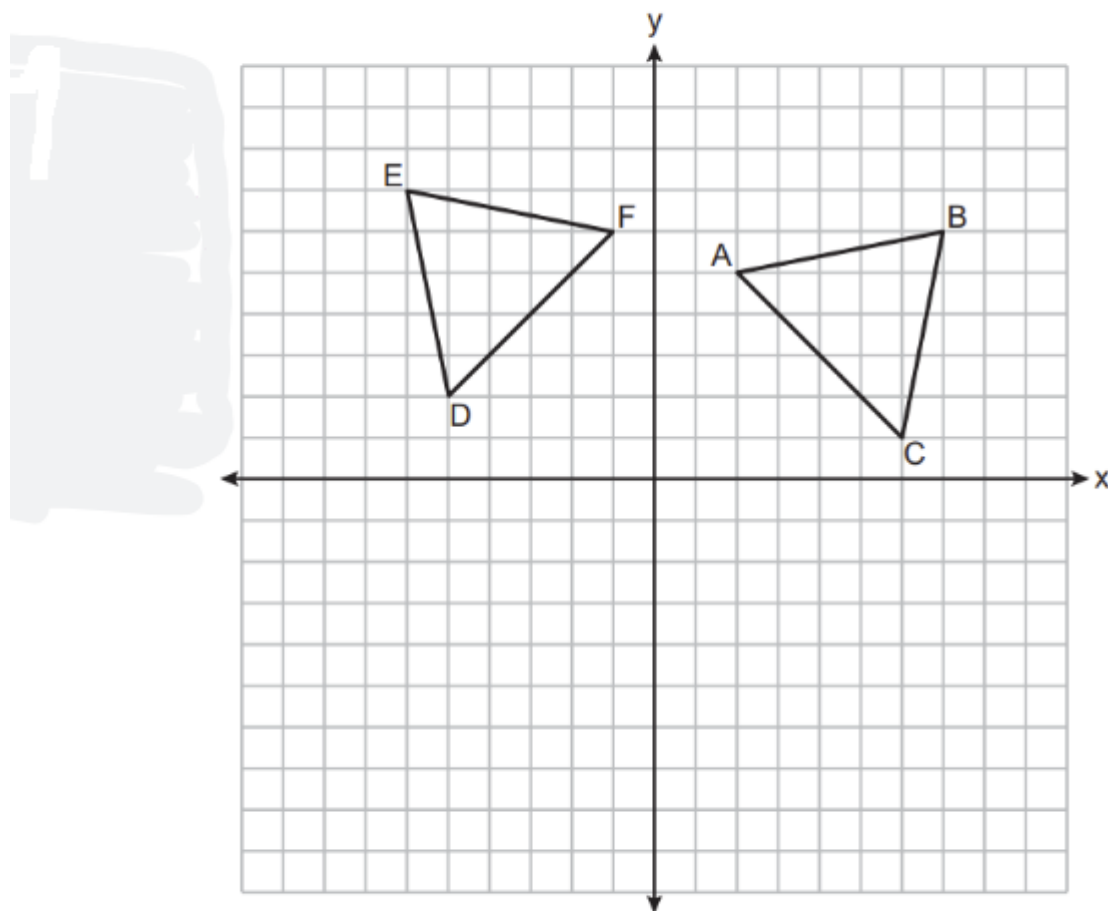
Scrap Graph Paper — this sheet will *not* be scored.

Tear Here



January 2024 #28

On the set of axes below, congruent triangles ABC and DEF are graphed.

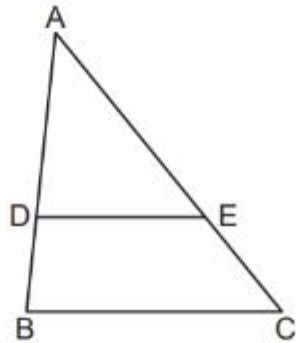


Describe a sequence of rigid motions that maps $\triangle ABC$ onto $\triangle DEF$.

Similarity

August 2023 #14

In triangle ABC below, D is a point on \overline{AB} and E is a point on \overline{AC} , such that $\overline{DE} \parallel \overline{BC}$.

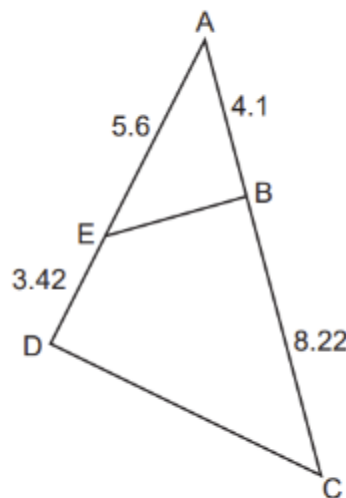


If $AD = 12$, $DB = 8$, and $EC = 10$, what is the length of \overline{AC} ?

- (1) 15 (3) 24
(2) 22 (4) 25

January 2024 #29

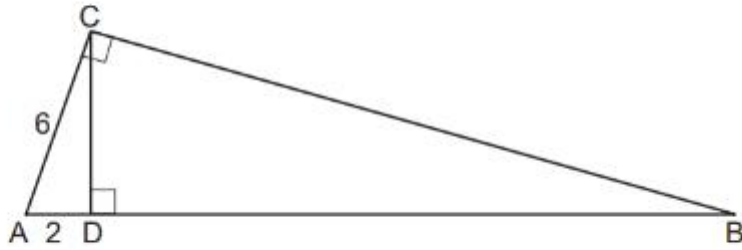
In $\triangle ADC$ below, \overline{EB} is drawn such that $AB = 4.1$, $AE = 5.6$, $BC = 8.22$, and $ED = 3.42$.



Is $\triangle ABE$ similar to $\triangle ADC$? Explain why.

June 2023 #30

In the diagram below of right triangle ACB , altitude \overline{CD} is drawn to hypotenuse \overline{AB} , $AD = 2$ and $AC = 6$.

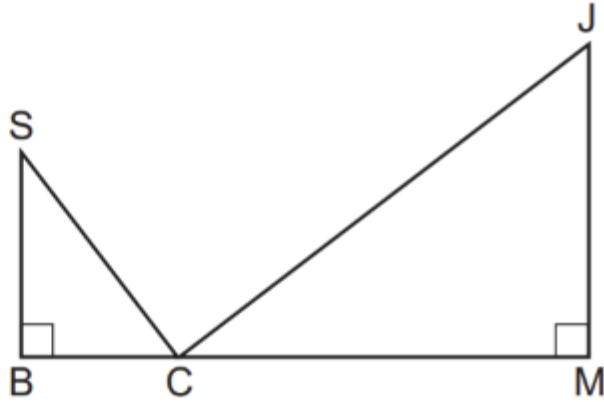


Determine and state the length of \overline{AB} .

Trigonometry

January 2024 #31

In the diagram below, $\triangle SBC \sim \triangle CMJ$ and $\cos J = \frac{3}{5}$.



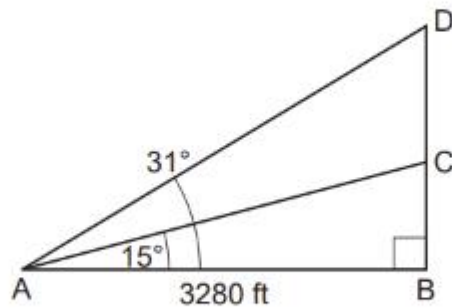
Determine and state $m\angle S$, to the *nearest degree*.

August 2016 #31

In the diagram below, a window of a house is 15 feet above the ground. A ladder is placed against the house with its base at an angle of 75° with the ground. Determine and state the length of the ladder to the *nearest tenth of a foot*.

June 2023 #32

Cape Canaveral, Florida is where NASA launches rockets into space. As modeled in the diagram below, a person views the launch of a rocket from observation area A , 3280 feet away from launch pad B . After launch, the rocket was sighted at C with an angle of elevation of 15° . The rocket was later sighted at D with an angle of elevation of 31° .



Determine and state, to the *nearest foot*, the distance the rocket traveled between the two sightings, C and D .

Volume and Measurement

January 2024 #24

A small town is installing a water storage tank in the shape of a cylinder. The tank must be able to hold at least 100,000 gallons of water. The tank must have a height of exactly 30 feet.

[1 cubic foot holds 7.48 gallons of water]

What should the minimum diameter of the tank be, to the *nearest foot*?

- | | |
|--------|--------|
| (1) 12 | (3) 65 |
| (2) 24 | (4) 75 |

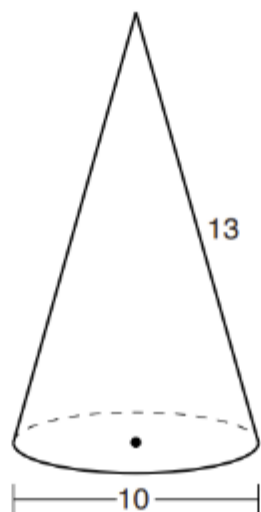
August 2023 #12

A regular pyramid with a square base is made of solid glass. It has a base area of 36 cm^2 and a height of 10 cm. If the density of glass is 2.7 grams per cubic centimeter, the mass of the pyramid, in grams, is

- | | |
|---------|---------|
| (1) 120 | (3) 360 |
| (2) 324 | (4) 972 |

June 2022 #27

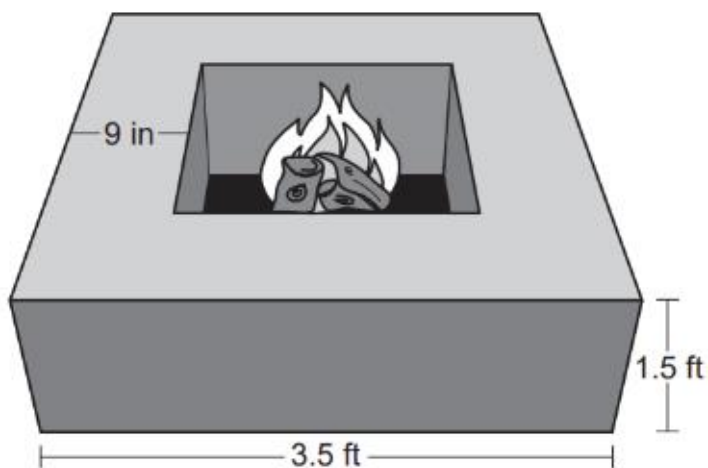
In the diagram below, a right circular cone has a diameter of 10 and a slant height of 13.



Determine and state the volume of the cone, in terms of π .

August 2023 #32

Josh is making a square-based fire pit out of concrete for his backyard, as modeled by the right prism below. He plans to make the outside walls of the fire pit 3.5 feet on each side with a height of 1.5 feet. The concrete walls of the fire pit are going to be 9 inches thick.



If a bag of concrete mix will fill 0.6 ft^3 , determine and state the minimum number of bags needed to build the fire pit.

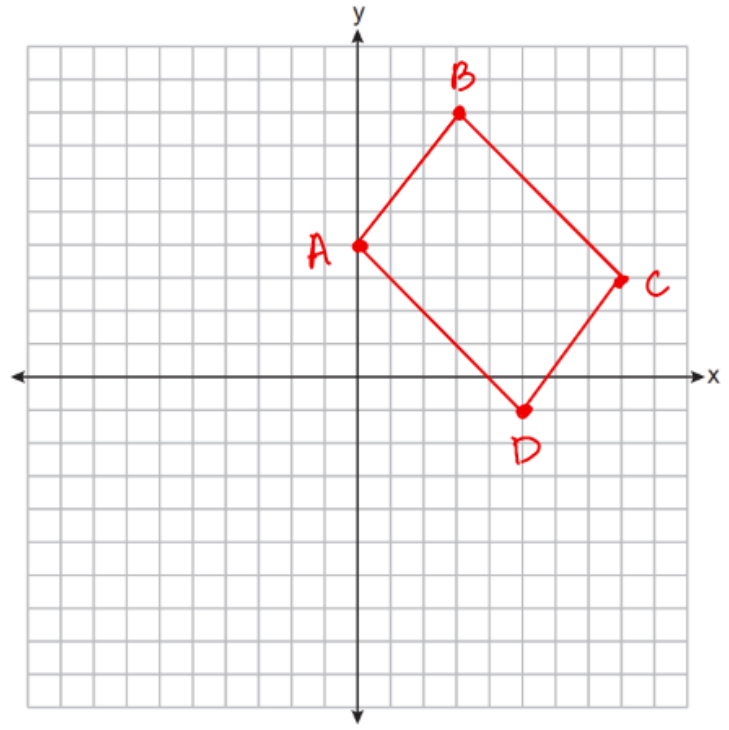
Quadrilateral Proofs

August 2023 #34

The coordinates of the vertices of quadrilateral $ABCD$ are $A(0,4)$, $B(3,8)$, $C(8,3)$, and $D(5,-1)$.

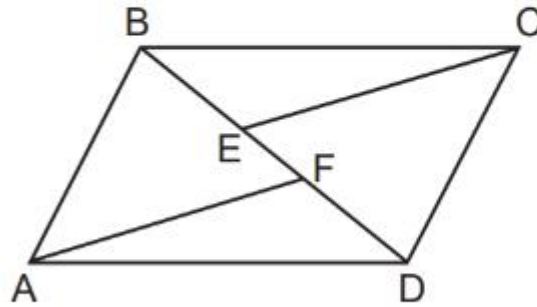
Prove that $ABCD$ is a parallelogram, but *not* a rectangle.

[The use of the set of axes below is optional.]



January 2024 #34

In the diagram of quadrilateral $ABCD$ below, $\overline{AB} \cong \overline{CD}$, and $\overline{AB} \parallel \overline{CD}$. Segments CE and AF are drawn to diagonal \overline{BD} such that $\overline{BE} \cong \overline{DF}$.



Prove: $\overline{CE} \cong \overline{AF}$