2025 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics
Question 34: Constructed-Response

Reporting Category: Geometry
Standard: G-SRT.B.5 - Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
Item Description: Determine unknown side lengths and angle measures of two similar triangles based on a diagram of the triangles.
Calculator: Allowed

This item can be found in the released item sets on the MCAS Resource Center.

Scoring Guide
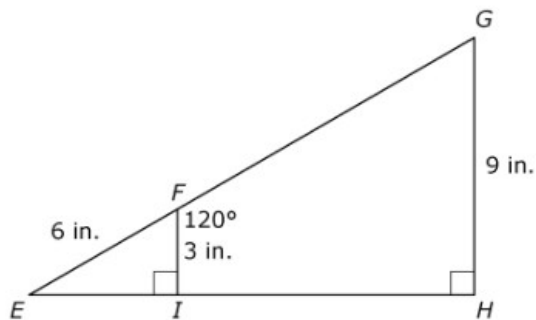*Select a score point in the table below to view the sample student response.*

Score*	Description
4A	The student response demonstrates an exemplary understanding of the Geometry concepts involved in using congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. The student correctly identifies the lengths and measures of corresponding sides and angles in a pair of similar right triangles.
4B	
3	The student response demonstrates a good understanding of the Geometry concepts involved in using congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Geometry concepts involved in using congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Geometry concepts involved in using congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
0	The student response contains insufficient evidence of an understanding of the Geometry concepts involved in using congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. As a result, the response does not merit any points.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 4A and 4B).

Score Point 4A

This question has four parts.

Triangle EFI is similar to triangle EGH. The triangles and some of their measurements are shown in this diagram.

Part A

What is the measure, in degrees, of $\angle E$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* <u>U</u> ☰ ☷ ☵ ☶ ☰ MATH ᴬᴮꞓ

$180 - 120 = 60$
$60 + 90 = 150$
$180 - 150 = 30$
$\angle E = 30°$

Part B

The length of $\overline{EF}$ is 6 inches, and the length of $\overline{IF}$ is 3 inches.

What is the scale factor between the corresponding sides of the triangles? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* <u>U</u> ☰ ☷ ☵ ☶ ☰ MATH ᴬᴮꞓ

$\frac{9}{3} = 3$

scale factor = 3 in.

Part C

What is the length, in inches, of $\overline{FG}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☱ ☲ ☲ ☰ MATH ᴬᴮ꜀
6 x 3 = 18 $18 - 6 = 12$ $\overline{FG}$ = 12 in.

Part D

What is the length, in inches, of $\overline{IH}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☱ ☲ ☲ ☰ MATH ᴬᴮ꜀
ΔEIF is a 30°, 60°, 90° triangle, so $\overline{EI} = 3\sqrt{3}$ $3\sqrt{3} \cdot 3 = 9\sqrt{3}$ $\overline{EH} = 9\sqrt{3}$ $9\sqrt{3} - 3\sqrt{3} = 6\sqrt{3}$ $\overline{IH} = 6\sqrt{3}$

Back to Scoring Guide

Score Point 4B

This question has four parts.

Triangle EFI is similar to triangle EGH. The triangles and some of their measurements are shown in this diagram.
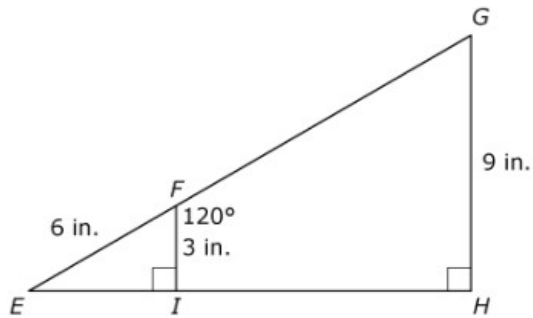
Part A

What is the measure, in degrees, of $\angle E$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ≔ ⊟ ⊒ ⊒ ≡ MATH ᴬᴮ�C
>
> 30° because $\angle F$ is 60 degrees & $\angle I$ is 90 and there are 180° in a triangle.

Part B

The length of $\overline{EF}$ is 6 inches, and the length of $\overline{IF}$ is 3 inches.

What is the scale factor between the corresponding sides of the triangles? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ≔ ⊟ ⊒ ⊒ ≡ MATH ᴬᴮC
>
> Multiplied by 3 because side $\overline{FI}$ and side $\overline{GH}$ are corresponding and $3 \cdot 3$ is 9.

Part C

What is the length, in inches, of $\overline{FG}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☰ ☰ ☰ ☰ MATH ᴬᵇᶜ

12 inches because side $\overline{EG}$ has to be 18 because 6x3 is 18.

Part D

What is the length, in inches, of $\overline{IH}$? Show or explain how you got your answer.

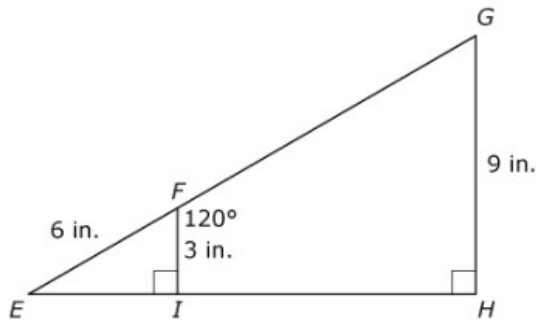Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☰ ☰ ☰ ☰ MATH ᴬᵇᶜ

10.4 in. because $\overline{EI}$ has to be 5.2 and 5.2 x 3 =
15.6
15.6 - 5.2 - 10.4

Back to Scoring Guide

Score Point 3

This question has four parts.

Triangle EFI is similar to triangle EGH. The triangles and some of their measurements are shown in this diagram.

Part A

What is the measure, in degrees, of $\angle E$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> B *I* U ≔ ≔ ⇤ ⇥ ≣   MATH ✓
>
> $m\angle E = 30°$, because $\angle IFG$ is given as $120°$, and is supplementary with $\angle EFI$. so $\angle EFI = 60°$
> $120 + 60 = 180$ since $\angle EFI$ is $60°$ and $\angle EFI$ is $90°$, $\angle E$ must = $30°$
> $30° + 60° + 90° = 180°$, the correct amount for a triangle.

Part B

The length of $\overline{EF}$ is 6 inches, and the length of $\overline{IF}$ is 3 inches.

What is the scale factor between the corresponding sides of the triangles? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> B *I* U ≔ ≔ ⇤ ⇥ ≣   MATH ✓
>
> The scale factor is $\frac{1}{3}$. Each corresponding side of $\triangle EFI$ is 3 times smaller than the sides of $\triangle EGH$. $\overline{FI}$ is corresponding to $\overline{GH}$ and $\overline{FI} = 3$, $\overline{GH} = 9$
> $\frac{3}{9} = \frac{1}{3}$

Part C

What is the length, in inches, of $\overline{FG}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ☰ ☷ ☷ ☷ ☰ MATH ᴿᴮᶜ
>
> 18in. $\dfrac{1}{3} = \dfrac{6}{x}$
>
> 18 = x

Part D

What is the length, in inches, of $\overline{IH}$? Show or explain how you got your answer.
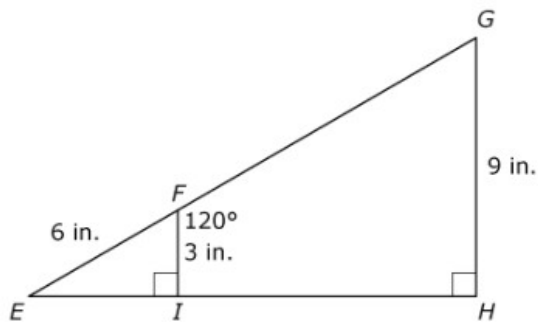
Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ☰ ☷ ☷ ☷ ☰ MATH ᴿᴮᶜ
>
> $6\sqrt{3}$ in, ΔEGH is a 30° 60° 90° triangle so since $\overline{GH} = 9\sqrt{3}$
>
> ΔEFI is also a 30° 60° 90° triangle so since $\overline{FI} = 3$ in, $\overline{EI} = 3\sqrt{3}$ in
>
> $9\sqrt{3} - 3\sqrt{3} = 6\sqrt{3}$

Score Point 2

This question has four parts.

Triangle EFI is similar to triangle EGH. The triangles and some of their measurements are shown in this diagram.

Part A

What is the measure, in degrees, of $\angle E$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☰ ☲ ☲ ☰ MATH ᴬᴮᑕ
The measure of $\angle E$ is $30°$ $180 - 90 = 90$ $90 - 60 = 30$

Part B

The length of $\overline{EF}$ is 6 inches, and the length of $\overline{IF}$ is 3 inches.

What is the scale factor between the corresponding sides of the triangles? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☰ ☲ ☲ ☰ MATH ᴬᴮᑕ
$\angle EFI \cong EGH$ because F and G has the same angles and I and H have the same angle.

Part C

What is the length, in inches, of $\overline{FG}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ≡ ≡ ≡ ≡ ≡ MATH ᴬᴮᶜ
>
> The length of $\overline{FG}$ is 12 inches
>
> $6 \times 3 = 18$
>
> $18 - 6 = 12$

Part D

What is the length, in inches, of $\overline{IH}$? Show or explain how you got your answer.

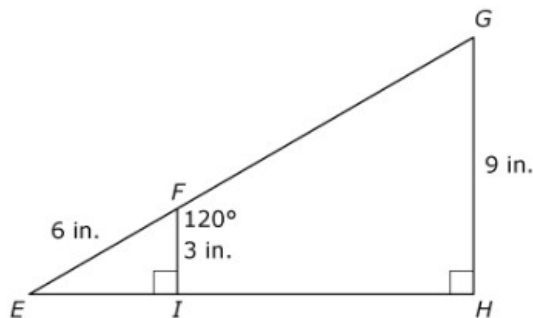Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ≡ ≡ ≡ ≡ ≡ MATH ᴬᴮᶜ
>
> The length of $\overline{IH}$ is 12 inches
>
> $6 \times 3 = 18$
>
> $18 - 6 = 12$

Back to Scoring Guide

Score Point 1

This question has four parts.

Triangle EFI is similar to triangle EGH. The triangles and some of their measurements are shown in this diagram.

Part A

What is the measure, in degrees, of $\angle E$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$\circlearrowleft$ $\circlearrowright$	**B** *I* U ≔ ≣ 彊 彊 ≣	MATH ᴬᴮᶜ

$\angle E$ is 30° . This is because of special triangles. The triangle is a 30, 60, 90 triangle. I could tell this because $\angle I$ has the 90° angle box.

Part B

The length of $\overline{EF}$ is 6 inches, and the length of $\overline{IF}$ is 3 inches.

What is the scale factor between the corresponding sides of the triangles? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$\circlearrowleft$ $\circlearrowright$	**B** *I* U ≔ ≣ 彊 彊 ≣	MATH ᴬᴮᶜ

The scale factor is 2 in. This is because $3 \cdot 3 = b$ and $6 \div 3 = 2$.

Part C

What is the length, in inches, of $\overline{FG}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ≔ ≔ ⊞ ⊞ ≡ MATH ᴬᴮꟲ
The length of $\overline{FG}$ is 15 in. This is because it has to be more than 9 in.

Part D

What is the length, in inches, of $\overline{IH}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ≔ ≔ ⊞ ⊞ ≡ MATH ᴬᴮꟲ
The length of $\overline{IH}$ is 9 in. It is the same as the length of $\overline{GH}$.

Back to Scoring Guide

Score Point 0

This question has four parts.

Triangle EFI is similar to triangle EGH. The triangles and some of their measurements are shown in this diagram.

Part A

What is the measure, in degrees, of $\angle E$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.
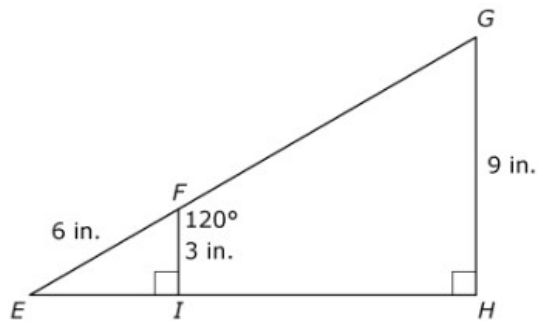
↶ ↷ **B** *I* U ☰ ☰ ☰ ☰ ☰ MATH ABC

The measure of $\angle E$ is 60° . I know this because there is a $30-60-90$ Triangle, and this angle is the middle angle making it 60° .

Part B

The length of $\overline{EF}$ is 6 inches, and the length of $\overline{IF}$ is 3 inches.

What is the scale factor between the corresponding sides of the triangles? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

↶ ↷ **B** *I* U ☰ ☰ ☰ ☰ ☰ MATH ABC

The scale factor between the corresponding sides of the triangles is 6:3. I know this because angle measure is 6 and the other is 3.

Part C

What is the length, in inches, of $\overline{FG}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ☰ ☰ ☰ ☰ ☰ MATH ᴬᴮᶜ
>
> The length of $\overline{FG}$ is 27 inches
> $$a^2 + b^2 = c^2$$
> $$a^2 + 3^2 = 6^2$$
> $$a^2 + 9 - 9 = 36 - 9$$
> $$a^2 = 27$$

Part D

What is the length, in inches, of $\overline{IH}$? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

> ↶ ↷ **B** *I* U ☰ ☰ ☰ ☰ ☰ MATH ᴬᴮᶜ
>
> The length of $\overline{IH}$ is 90 inches.
> $$a^2 + b^2 = c^2$$
> $$3^2 + 9^2 = c^2$$
> $$9 + 81 = c^2$$
> $$90 = c^2$$