

2024 MCAS Sample Student Work and Scoring Guide

Grade 10 Mathematics

Question 27: Constructed-Response

Reporting Category: Geometry

Standards: [GEO.G-C.A.2](#) - Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

[MII.G-C.A.2](#) - Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

Item Description: Determine minor arc measures, a major arc measure, and an angle measure given a figure inscribed in a circle.

Calculator: Allowed

[View item in MCAS Digital Item Library](#)

Scoring Guide

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

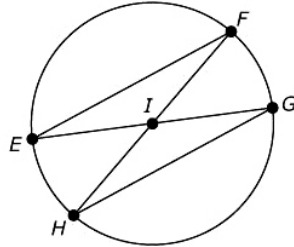
Score*	Description
4A	The student response demonstrates an exemplary understanding of the Geometry concepts involved in identifying and describing relationships among inscribed angles, radii, and chords, including the relationship between central and inscribed angles. The student correctly determines arc measures on a circle and angle measures of a figure inscribed in the circle.
4B	
3	The student response demonstrates a good understanding of the Geometry concepts involved in identifying and describing relationships among inscribed angles, radii, and chords, including the relationship between central and inscribed angles. Although there is significant evidence that the student can 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 identifying and describing relationships among inscribed angles, radii, and chords, including the relationship between central and inscribed angles. 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 Geometry concepts involved in identifying and describing relationships among inscribed angles, radii, and chords, including the relationship between central and inscribed angles.
0	The student response contains insufficient evidence of an understanding of the Geometry concepts involved in identifying and describing relationships among inscribed angles, radii, and chords, including the relationship between central and inscribed angles. 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.

In circle I , \overline{EG} and \overline{FH} are diameters, and \overline{EF} and \overline{GH} are parallel, as shown.



The measure of angle EIH is 42° .

Part A

What is the measure, in degrees, of \widehat{FG} ? Show or explain how you got your answer.

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

The measure is 42 degrees. I got my answer because the arc corresponding with a central angle is the same measure as the central angle, and $\angle FIG$ is 42 degrees (vertical angles) so its arc FG is also 42 degrees.

Part B

What is the measure, in degrees, of \widehat{EF} ? Show or explain how you got your answer.

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

The measure is 138 degrees. I got my answer by first recognizing that if arc FG is 42 degrees then arc EH is also 42 degrees. This totals 84 degrees and leaves a remaining 276 degrees in the other two arcs, which are also equal. Therefore, to find one of them you divide 276 by 2, getting 138.

Part C

What is the measure, in degrees, of \widehat{FGE} ? Show or explain how you got your answer.

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

The measure is 222 degrees. I got my answer by adding the degrees of all three separately found arcs that arc FGE encompasses. $42 + 42 + 138 = 222$

Part D

What is the measure, in degrees, of **angle** FHG ? Show or explain how you got your answer.

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

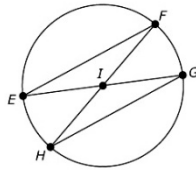
The measure is 21 degrees. I got my answer by recognizing that angle FHG is an inscribed angle, and the arc that it corresponds with is FG , which has a measure of 42 degrees. The measure of an inscribed angle is the measure of the arc its attached to divided by 2, and $\frac{42}{2} = 21$.

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Score Point 4B

This question has four parts.

In circle I , \overline{EG} and \overline{FH} are diameters, and \overline{EF} and \overline{GH} are parallel, as shown.



The measure of angle EIH is 42° .

Part A

What is the measure, in degrees, of \widehat{FG} ? Show or explain how you got your answer.

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

\widehat{FG} is congruent to \widehat{EH} because of being a vertical angle, and the arc is the same as it, so therefore \widehat{FG} is 42 degrees.

Part B

What is the measure, in degrees, of \widehat{EF} ? Show or explain how you got your answer.

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

$\frac{(360 - 42 - 42)}{2} = 138$, so \widehat{EF} is 138 degrees

Part C

What is the measure, in degrees, of \widehat{FGE} ? Show or explain how you got your answer.

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

$138 + 42 + 42 = 222$, so that arc is 222 degrees

Part D

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

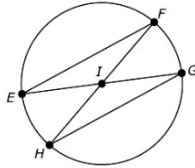
Enter your answer and your work or explanation in the space provided.

\widehat{FHG} is half of the arc it makes, so it is 21 degrees

Score Point 3

This question has four parts.

In circle I , \overline{EG} and \overline{FH} are diameters, and \overline{EF} and \overline{GH} are parallel, as shown.



The measure of angle EIH is 42° .

Part A

What is the measure, in degrees, of \widehat{FG} ? Show or explain how you got your answer.

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

42° . Angle EIH is equal to \widehat{EH} . \widehat{EH} is equal to \widehat{FG} .

Part B

What is the measure, in degrees, of \widehat{EF} ? Show or explain how you got your answer.

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

138° . Add the two angles we know up. $42 + 42 = 84$. Then subtract 84 from 360 which will equal 276. Divide 276 by 2 and then our answer is 138° .

Part C

What is the measure, in degrees, of \widehat{FGE} ? Show or explain how you got your answer.

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

222° . First take the $42 + 42 = 84$ and add 84 to 138, so our answer is 222° .

Part D

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

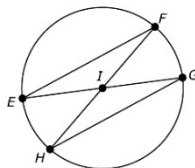
Enter your answer and your work or explanation in the space provided.

For this angle we need to add the 138° angle from \widehat{EF} , the 42° angle from \widehat{EH} and the 138° angle from \widehat{HG} so we get 318° . Another way is subtracting the $42^\circ \widehat{FG}$ from 360 to also get 318° .

Score Point 2

This question has four parts.

In circle I , \overline{EG} and \overline{FH} are diameters, and \overline{EF} and \overline{GH} are parallel, as shown.



The measure of angle EIH is 42° .

Part A

What is the measure, in degrees, of \widehat{FG} ? Show or explain how you got your answer.

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

The measure of FG is 42 since EIH is 42 aswell they are the same.

Part B

What is the measure, in degrees, of \widehat{EF} ? Show or explain how you got your answer.

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

EF is 138 because EHI and GIF both equal 42 so you add them and get 84 then subtract 84 from 360 because that is the total of the shape then you get 276 then divide that by 2 since there are two sides so then you would get 138.

Part C

What is the measure, in degrees, of \widehat{FGE} ? Show or explain how you got your answer.

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

FGE is equal too 180 because you just need to add the two angles up.

Part D

What is the measure, in degrees, of **angle** FHG ? Show or explain how you got your answer.

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

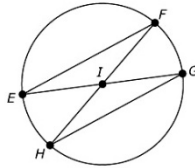
FHG is the same as FGE just on the oppisite side of the shape.

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Score Point 1

This question has four parts.

In circle I , \overline{EG} and \overline{FH} are diameters, and \overline{EF} and \overline{GH} are parallel, as shown.



The measure of angle EIH is 42° .

Part A

What is the measure, in degrees, of \widehat{FG} ? Show or explain how you got your answer.

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

42 it is vertical to EIH and vertical angles are congruent.

Part B

What is the measure, in degrees, of \widehat{EF} ? Show or explain how you got your answer.

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

42 because it is parallel to gh.

Part C

What is the measure, in degrees, of \widehat{FGE} ? Show or explain how you got your answer.

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

84 both the angles add up to 84.

Part D

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

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

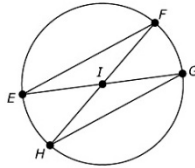
60 all measures of an equilateral triangle are 60.

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Score Point 0

This question has four parts.

In circle I , \overline{EG} and \overline{FH} are diameters, and \overline{EF} and \overline{GH} are parallel, as shown.



The measure of angle EIH is 42° .

Part A

What is the measure, in degrees, of \widehat{FG} ? Show or explain how you got your answer.

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

FG would be 20 degrees because it has to be less than EIH

Part B

What is the measure, in degrees, of \widehat{EF} ? Show or explain how you got your answer.

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

50 degrees because its visually longer than eih

Part C

What is the measure, in degrees, of \widehat{FGE} ? Show or explain how you got your answer.

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

67 because EIH is 42 degrees and FGE is just EIH but instead of stopping at the mid point you stop at the other point on the other side of the shape

Part D

What is the measure, in degrees, of **angle** FHG ? Show or explain how you got your answer.

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

63 degree angle

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