568416 - Mathematics

Guide

2- Correction key

1 D

2 Example of an appropriate method

Area of the base

$$\sqrt{19(19-16)(19-12)(19-10)} = \sqrt{3591} = 59.924\ldots \text{ m}^2$$

Volume of water

Area of the base × height

$59.924\ldots \times 2 = 119.84\ldots \text{ m}^3$

Cost of treating the water with chlorine

$119.84\ldots \times 0.10 = \$11.984\ldots$

Answer: It costs $11.98 to treat the water in this pool with chlorine.

Note: Students who use an appropriate method in order to determine the area of the base of the pool have shown that they have a partial understanding of the problem.

3 B

4 Example of an appropriate solution

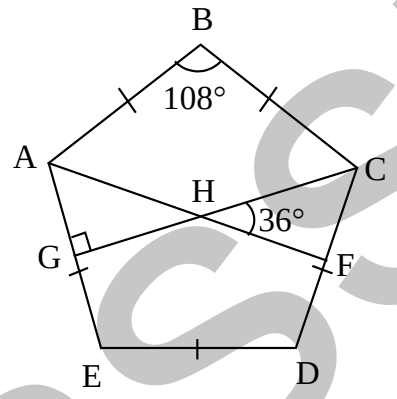
Statements	Reasons
1. m $\angle$EFG = 50°	1. Two parallel lines intercepted by a transversal determine two pairs of alternating interior congruent angles.
2. m $\angle$FEG = 50°	2. In an isosceles triangle, the angles opposite the congruent sides are congruent.
3. m $\angle$FGE = 80°	3. The sum of the interior angles of a triangle is 180°.
4. m $\angle$EGD = 100°	4. Two adjacent angles whose exterior sides form a straight line are supplementary.

Answer: The measure of angle EGD is 100°.

5 C

6 Example of an appropriate solution

Angle BAE measures 108° because the interior angles of a regular pentagon are congruent.



Angle HAG measures 54° because $\overline{AF}$ is an angle bisector.

Angle AHG measures 36° because vertically opposite angles are congruent and it is congruent to angle CHF.

Since the sum of the interior angles of a triangle is 180°,

m $\angle$AGH = 180° – (36° + 54°).

Hence, m $\angle$AGH = 90°

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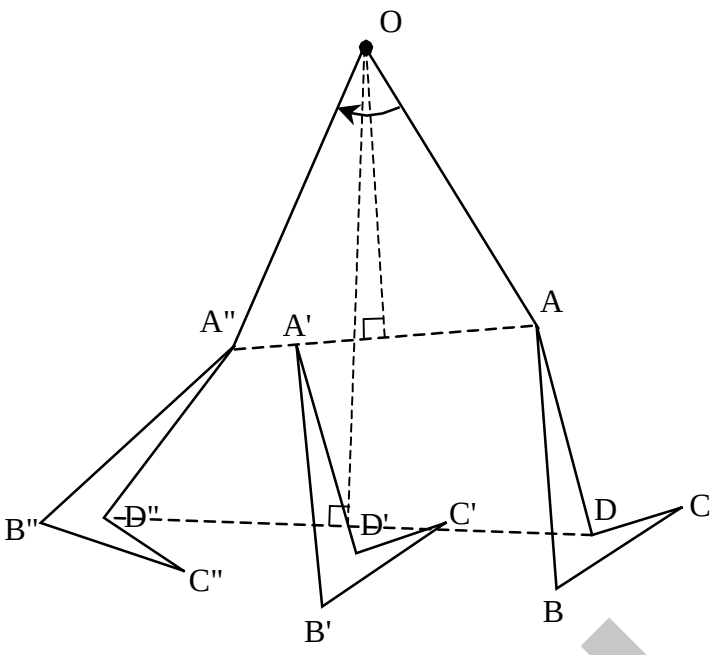


8

Statements	Justifications
1	D
2	E
3	A
4	B

9 A

10 Example of an appropriate method of solution

1. Since $\overline{AB}$ // $\overline{CD}$, then alternate interior angles ABC and BCD are congruent. Hence, m $\angle$BCD = m $\angle$ABC = 38°.

2 Since $m\,\overline{BC} = m\,\overline{CD}$, then triangle BCD is an isosceles triangle.

Hence, m $\angle$BDC = m $\angle$CBD.

3. Since the measures of the interior angles of triangle BCD is 180° and m $\angle$BCD = 38°, then m $\angle$BDC + m $\angle$CBD = 180° − 38° = 142°

Hence, m $\angle$BDC = $\frac{142°}{2}$ = 71°.

11 B

12 Example of an appropriate method

Since $\text{m}\,\overline{\text{AB}} = \text{m}\,\overline{\text{BC}}$, triangle ABC is an isosceles triangle,

where m ∠BAC = m ∠ACB.

The sum of the measures of the interior angles of a triangle is 180° and angle ABC measures 58°.

Hence, m ∠ACB $= \dfrac{180° - 58°}{2} = 61°$

Since $\overline{\text{BC}}$ // $\overline{\text{EF}}$, corresponding angles ACB and GHE are congruent.

Hence, m ∠GHE = 61°.

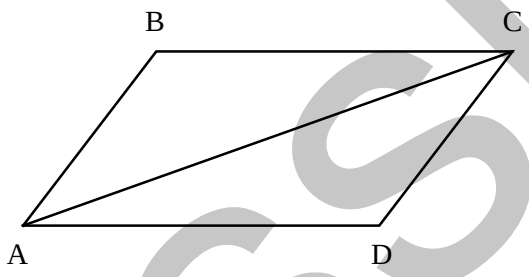
13 Triangles AED and BEC are isometric because two triangles whose corresponding sides are congruent must be isometric.

14 B

15 C

16 A

17 Work : (example)



Statements	Justifications
1. $m\ \overline{AB} = m\ \overline{CD}$	1. The opposite sides of a parallelogram are congruent.
2. $m\ \overline{BC} = m\ \overline{AD}$	2. The opposite sides of a parallelogram are congruent.
3. $m \angle ABC = m \angle ADC$	3. The opposite angles of a parallelogram are congruent.
4. $\Delta ABC \cong \Delta ADC$	4. Two triangles are congruent if they have one congruent angle bounded by two congruent sides. or S-A-S

18 Example of an appropriate solution

Perimeter : 6.3 m or 630 cm

Measure of each side : $\frac{630}{6}$ = 105 cm

Heron's Formula :

S(area of a triangle) = $\sqrt{p(p-a)(p-b)(p-c)}$

$P = \frac{1}{2}(a + b + c)$

$P = \frac{1}{2}(105 \times 3)$

$P = \frac{315}{2}$ = 157.5 cm

S(area of a triangle) $= \sqrt{157.5\,(157.5-105)\,(157.5-105)\,(157.5-105)}$

$= \sqrt{157.5\,(52.5)\,(52.5)\,(52.5)}$

$= \sqrt{22\,790\,742.19}$

≈ 4774 cm^2

Area of the hexagon

$4774 \times 6 = 28\,644$ cm^2 or 2.8644 m^2

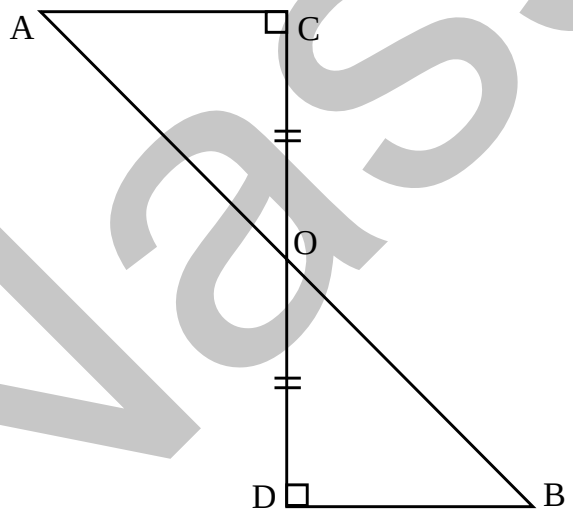
Final answer The area of the table is 2.8644 m^2.

Date : _____

568416 - Mathematics

Question Booklet

1 In the adjacent diagram, $\overline{AB}$ and $\overline{CD}$ intersect at O. $\overline{AC} \perp \overline{CD}$ and $\overline{BD} \perp \overline{CD}$.



Which of the following statements could be used to prove that triangle ACO is congruent to triangle BDO?

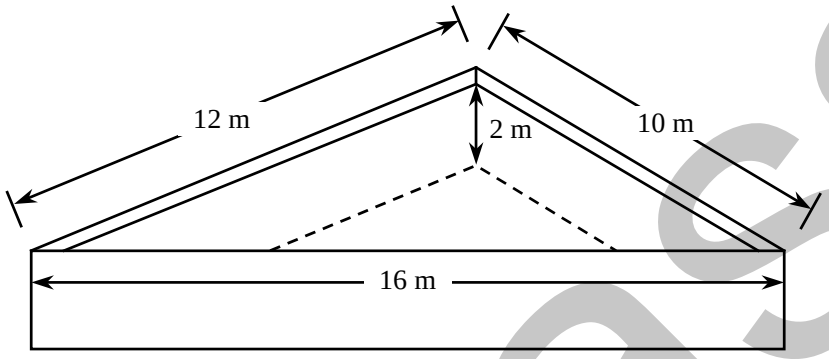
A) Two triangles whose corresponding sides are congruent must be congruent. (SSS)

B) Two triangles whose corresponding angles are congruent must be congruent. (AA)

C) If two sides and the contained angle of one triangle are congruent to two sides and the contained angle of another triangle, then the triangles must be congruent. (SAS)

D) If two angles and the contained side of one triangle are congruent to two angles and the contained side of another triangle, then the triangles must be congruent. (ASA)

2 A swimming pool is in the shape of a right prism with a triangular base. The edges of the base measure 12 m, 10 m and 16 m respectively. The water in the pool is 2 m deep.

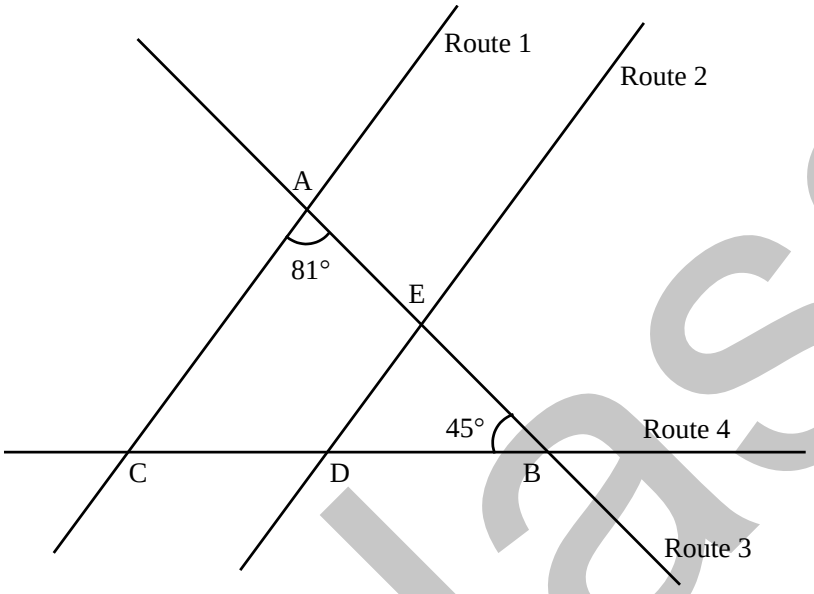


Treating the water with chlorine costs $0.10 per cubic metre of water.

How much does it cost to treat the water in this pool with chlorine?

Show all your work.

3 A road map shows four linear routes. Route 1 is parallel to route 2.



The following is part of a procedure used to determine the measure of angle EDB.

Step 1	m ∠ACB = 54° because the sum of the measures of the interior angles of triangle ACB is equal to 180°.
Step 2	m ∠EDB = m ∠ACB = 54° because…

Which one of the following statements correctly completes step 2 of this procedure?

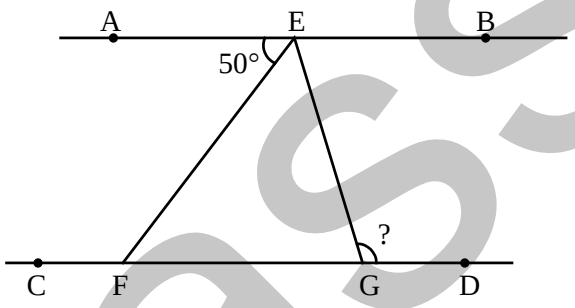
A) Angles EDB and ACB are vertically opposite angles, and are therefore congruent.

B) Angles EDB and ACB are corresponding angles formed when a transversal intersects two parallel lines, and are therefore congruent.

C) Angles EDB and ACB are alternate interior angles formed when a transversal intersects two parallel lines, and are therefore congruent.

D) Angles EDB and ACB are alternate exterior angles formed when a transversal intersects two parallel lines.

4 In the figure on the right, AB and CD are parallel lines. In triangle EGF, $\overline{EG}$ is congruent to $\overline{FG}$.



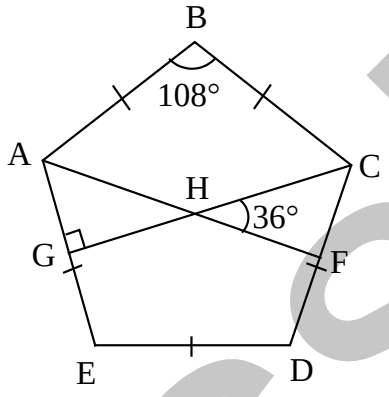
The measure of angle AEF is 50º.

What is the measure of angle EGD?

Justify each step of your work.

Show all your work.

6 Consider the regular pentagon on the right.



$\overline{AF}$ and $\overline{CG}$ are angle bisectors that intersect at H.

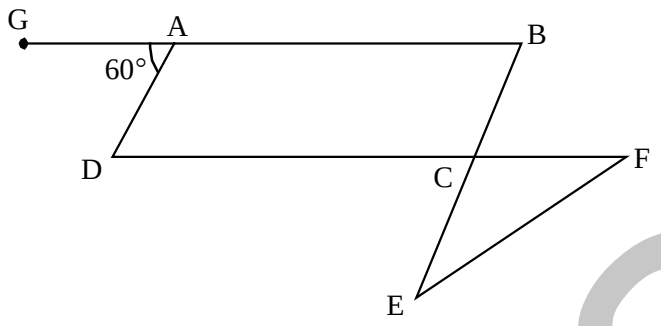
Also, m ∠ABC = 108° and m ∠CHF = 36°.

Prove that angle AGH measures 90°.

Explain each step of your reasoning.

Show all your work.

8 In the figure below, ABCD is a parallelogram and CFE is an isosceles triangle.



Match each numbered statement used in determining the measure of angle CFE with the appropriate lettered justification.

Statements	**Justifications**
1. m ∠ADC = m ∠GAD = 60°	A) Adjacent angles whose external sides are in a straight line are supplementary.
2. m ∠BCF = m ∠ADC = 60°	B) In an isosceles triangle, the angles opposite the congruent sides are congruent.
3. m ∠ECF = 180° – m ∠BCF = 120°	C) Vertically opposite angles are congruent.
4. m ∠CFE = (180° – m ∠ECF) ÷ 2 m ∠CFE = 30°	D) If a transversal intersects two parallel lines, the alternate interior (exterior) angles are congruent.
	E) If a transversal intersects two parallel lines, the

corresponding angles are congruent.

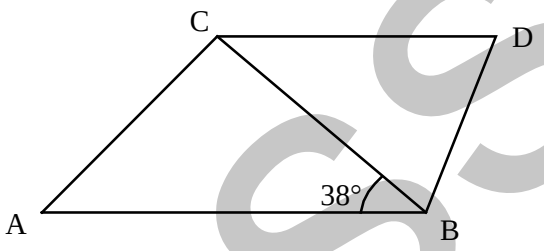
10 In the figure on the right,

$\overline{AB}$ // $\overline{CD}$

$\overline{BC}$ is a transversal

m $\overline{BC}$ = m $\overline{CD}$

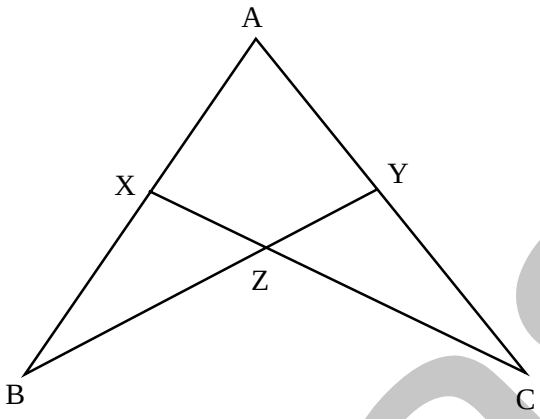
m ∠ABC = 38°



Show that the measure of angle BDC is 71°.

Justify each step of your work.

11 In triangles ABY and AXC shown below, $\overline{AX} \approx \overline{AY}$ and $\overline{AB} \approx \overline{AC}$.



Which one of the following statements could be used to prove that triangle ABY is congruent to triangle ACX?

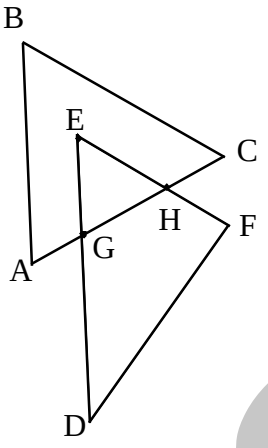
A) If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent.(SSS)

B) If two sides and a contained angle of one triangle are congruent to two sides and the contained angle of another triangle, then the triangles are congruent.(SAS)

C) If two angles and a contained side of one triangle are congruent to two angles and the contained side of another triangle, then the triangles are congruent.(ASA)

D) If two angles of one triangle are congruent to two angles of another triangle, then the triangles are congruent.(AA)

12 In the figure on the right,



$\overline{BC} \parallel \overline{EF}$

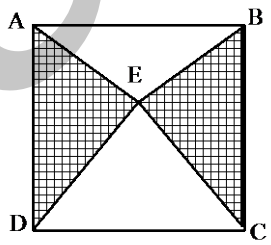
$m\overline{AB} = m\overline{BC}$

$m\angle ABC = 58°$

Show that angle GHE measures 61°.

Explain each step in your work.

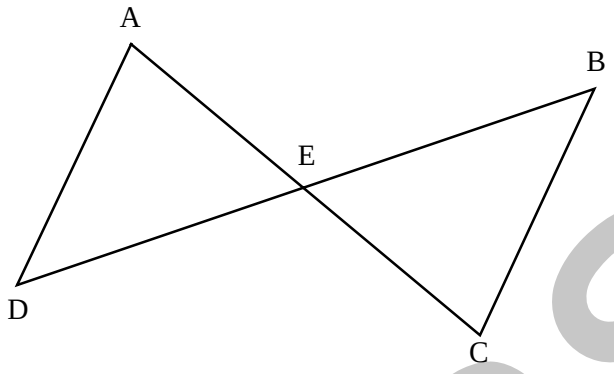
13 A seamstress makes a quilt by assembling triangular pieces to form square ABCD illustrated on the right.



In this square, triangles ABE and CDE are isosceles triangles.

Why are triangles AED and BEC isometric?

15 In the diagram below, E is the mid-point of segments AC and BD.



Which statement can be used to prove that triangle AED is congruent to triangle CEB?

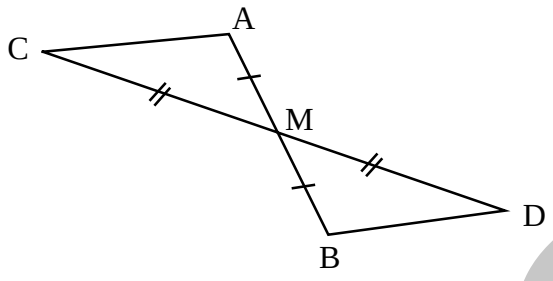
A) Two triangles having three corresponding sides congruent, must be congruent.

B) Two triangles having two corresponding angles congruent, must be congruent.

C) Two triangles having two corresponding sides and the contained angle congruent, must be congruent.

D) Two triangles having two corresponding angles and the contained side congruent, must be congruent.

16 In the figure below, M is the midpoint of segments AB and CD.



Which of the following can be used to justify that triangles AMC and BMD are congruent?

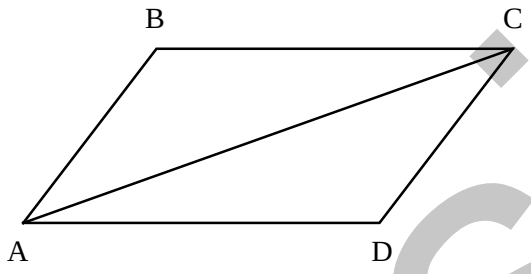
A) Two triangles are congruent if they have one congruent angle bounded by two corresponding congruent sides. (SAS)

B) Two triangles are congruent if they have three corresponding congruent sides. (SSS)

C) Two triangles are congruent if they have one congruent side between two corresponding congruent angles. (ASA)

D) Two triangles are congruent if they have two corresponding congruent angles. (AA)

17 Given parallelogram ABCD to the right, prove that triangle ABC and ADC are congruent.



Justify your statements.

18 A table in a conference room, in the shape of a regular hexagon, has a perimeter of 6.3 m.

Calculate the area of this table.

Show all the work needed to solve the problem.