Math·U·See

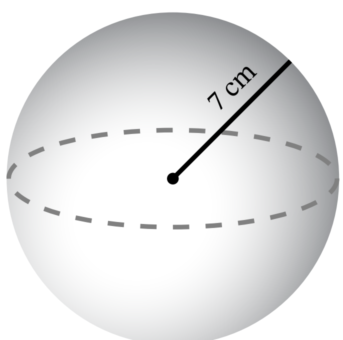
Instructor Quick Check: Question Block 10

How to Administer the Quick Check:

- The Quick Check consists of two parts: an Instructor portion which includes solutions and a Student portion with problems for each concept.
- **Your student need only complete the Quick Check problems for the concepts for which you responded Unsure.**
- Have your student complete the Quick Check items independently. You may attempt to clarify the wording of a question, but you should not provide hints about how to solve a problem.
- Return to the Question Block when you have checked your student's work.
- *You should now be able to answer **Yes** or **No** for each question.*
- Click **Next** to go to the next screen.

10.1 Can my student use equations to find the volume and surface area of various solids?

10.1a **Find the volume of a sphere with a radius of 7 centimeters.**



$\boldsymbol{V = 457\,\frac{1}{3}\,\pi\ \text{cm}^3}$

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi\,(7\text{ cm})^3$

$V = \frac{4}{3}\pi\,(343\text{ cm}^3)$

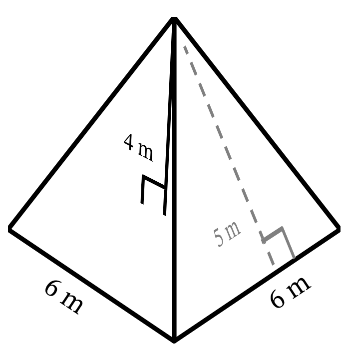
$V = \frac{4\,(343\text{ cm}^3)}{3}\pi$

$V = \frac{1{,}372}{3}\pi\ \text{cm}^3$ or $V = 457\,\frac{1}{3}\,\pi\ \text{cm}^3$

These are better answers since they are precise and not rounded.

Alternatively, if rounding, you might get an answer like $V \approx 1{,}437\text{ cm}^3$ or $V \approx 1{,}436\text{ cm}^3$.

10.1b **Find the surface area of a square pyramid with a 6m × 6m base, an altitude of 4m, and a slant height of 5m.**



96 m²

A square pyramid has five faces. Finding the surface area means finding the sum of the area of these five faces (one square and four congruent triangles).

$SA = 1 \times A_{\text{square}} + 4 \times A_{\text{triangle}}$

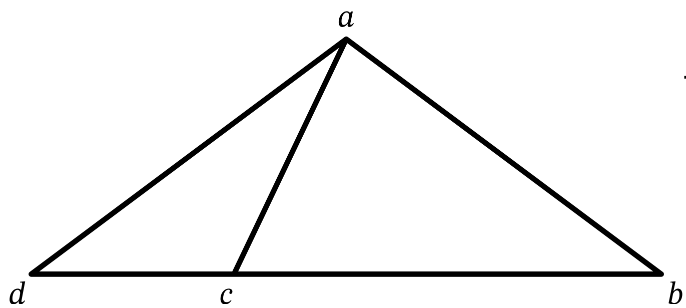
$A_{\text{square}} = s^2 = (6\text{ m})^2 = 36\text{ m}^2$

$A_{\text{triangle}} = \frac{1}{2}bh = \frac{1}{2}(6\text{ m})(5\text{ m}) = 15\text{ m}^2$

$SA = 1(36\text{ m}^2) + 4(15\text{ m}^2) = 36\text{ m}^2 + 60\text{ m}^2 = 96\text{ m}^2$

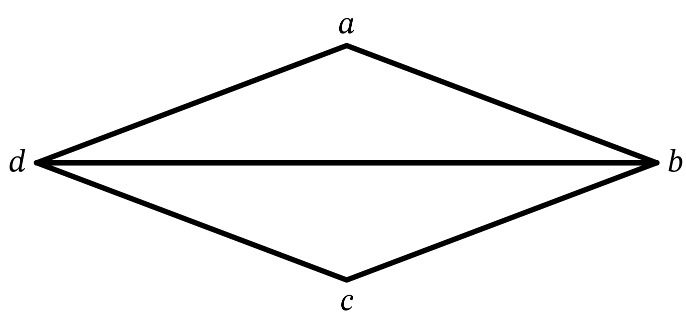
10.2 Can my student use triangle postulates and theorems to demonstrate congruency and similarity?

10.2a **Prove that triangles $\triangle abd$ and $\triangle acd$ are similar using the diagram below and the angle-angle (AA) postulate, given that $\angle bad \cong \angle acd$.**



Statements	Reasons
$\angle bad \cong \angle acd$	Given
$\angle bda \cong \angle adc$	Reflexive Property
$\triangle abd \sim \triangle acd$	AA Postulate

10.2b **Prove that triangles $\triangle$abd and $\triangle$bcd are congruent using the side-angle-side (SAS) postulate, given that $\overleftrightarrow{ab} \cong \overleftrightarrow{cb}$ and $\overleftrightarrow{db}$ bisects $\angle$abc.**

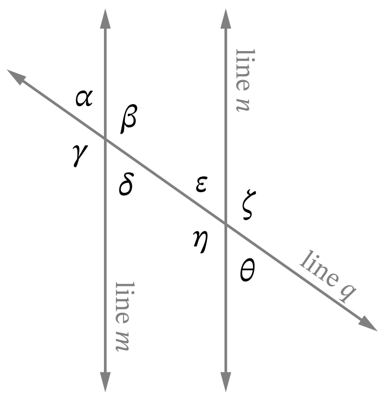


Statements	Reasons
$\overline{ab} \cong \overline{cb}$ (Side)	Given
$\overline{db}$ bisects $\angle abc$	Given
$\angle abd \cong \angle cbd$ (Angle)	Definition of Bisector
$\overline{bd} \cong \overline{bd}$ (Side)	Reflexive Property
$\triangle abd \cong \triangle bcd$	SAS Postulate

Note: The statements must follow a flow of logic, but they do not necessarily have to be placed in this order. For example, students could have listed the two sides first, before showing that the angles were congruent.

10.3 Can my student use parallel line postulates and theorems to find measures of unlabeled angles?

10.3a **Using the following diagram (not to scale), find the measure of angle α if line *m* is parallel to line *n* and the measure of angle θ is 30°.**



There are a variety of ways to prove that $m\angle\alpha = m\angle\theta$, but the conclusion should be that $m\angle\alpha = 30°$. However, note that these methods only work because line *m* || line *n*.

The most direct method is to see that $\angle\alpha$ is alternate exterior to $\angle\theta$, which makes them congruent.

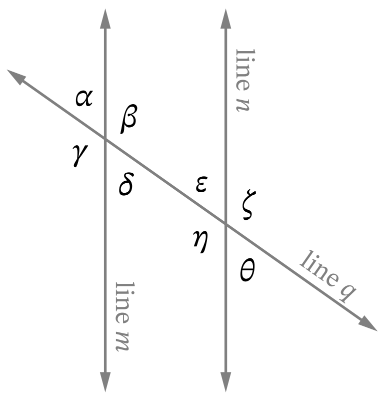
Statements	**Reasons**
line *m* || line *n*	Given
$\angle\alpha \cong \angle\theta$	Alternate Exterior Angles
$m\angle\alpha = m\angle\theta$	Definition of Congruence
$m\angle\alpha = 30°$	Transitive Property (If A = B and B = C, then A = C.) Substitution is also a valid reason.

Another method is to see that $\angle\theta$ and $\angle\delta$ are corresponding angles, and $\angle\delta$ and $\angle\alpha$ are vertical angles.

Statements	**Reasons**
line *m* || line *n*	Given
$\angle\theta \cong \angle\delta$	Corresponding Angles
$\angle\delta \cong \angle\alpha$	Vertical Angles
$\angle\theta \cong \angle\alpha$	Transitive Property or Substitution
$m\angle\theta = m\angle\alpha$	Definition of Congruence
$m\angle\alpha = 30°$	Transitive Property or Substitution

10.3 Can my student use parallel line postulates and theorems to find measures of unlabeled angles?

10.3b **Using the same diagram, find the measure of angle δ if lines *m* and *n* are parallel and the measure of angle θ is 55°.**



There are a variety of ways to prove that $m\angle\delta = m\angle\theta$, but the conclusion should be that $m\angle\delta = 55°$.

The most direct method is to see that $\angle\delta$ is corresponding to $\angle\theta$, which makes them congruent.

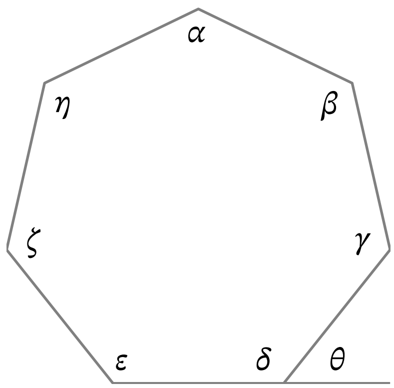
Statements	**Reasons**
line *m* ∥ line *n*	Given
$\angle\delta \cong \angle\theta$	Corresponding Angles
$m\angle\delta \cong m\angle\theta$	Definition of Congruence
$m\angle\delta = 55°$	Transitive Property or Substitution

Another method is to see that $\angle\theta$ and $\angle\alpha$ are alternate exterior angles, and $\angle\delta$ and $\angle\alpha$ are vertical angles.

Statements	**Reasons**
line *m* ∥ line *n*	Given
$\angle\theta \cong \angle\alpha$	Alternate Exterior Angles
$\angle\alpha \cong \angle\delta$	Vertical Angles
$\angle\theta \cong \angle\delta$	Transitive Property or Substitution
$m\angle\theta = m\angle\delta$	Definition of Congruence
$m\angle\delta = 55°$	Transitive Property or Substitution

10.4 Can my student use regular polygon postulates and theorems to find measures of unlabeled angles?

10.4a **Using the following diagram without measuring, calculate the measure of angle α assuming that the shape is a regular polygon (all seven sides are congruent).**



$128\frac{4}{7}°$ or $\approx 128.57°$

By definition of a regular polygon, all sides and all angles are congruent. There are two ways to find m$\angle\alpha$.

Method 1: Using the formula for interior angles of regular polygons.

Interior Angle Measure $= \frac{((n-2)(180°))}{n}$ where n is the number of sides.

$m\angle\alpha = \frac{((7-2)(180°))}{7} = \frac{(5(180°))}{7} = \frac{900°}{7}$ or $128\frac{4}{7}°$ (or $\approx 128.57°$)

Note: Unrounded answers (like $\frac{900}{7}°$ or $128\frac{4}{7}°$ in this case) are preferable, but rounded answers (like 128.57°) are also acceptable and may vary slightly depending on the methods of rounding used.

Method 2: Find the exterior angle.
Then subtract the exterior angle from 180°.

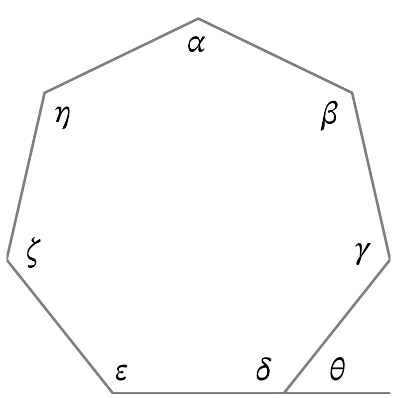
Exterior Angle Measure $= \frac{(360°)}{n}$ where n is the number of sides.

$m\angle\theta = \frac{(360°)}{7} = 51\frac{3}{7}° \approx 51.43°$

$m\angle\alpha = 180° - 51\frac{3}{7}°$

$m\angle\alpha = 128\frac{4}{7}°$ (or $\approx 128.57°$)

10.4b **Using the same diagram without measuring and assuming that the shape is a regular polygon, calculate the measure of angle θ.**



$51\frac{3}{7}°$ or $\approx 51.43°$

Exterior Angle Measure $= \frac{(360°)}{n}$ where n is the number of sides.

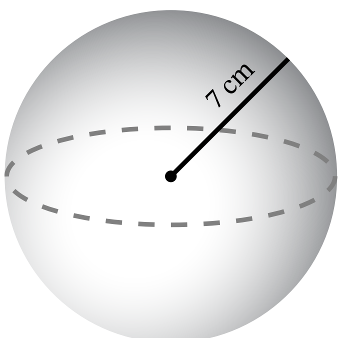
$m\angle\theta = \frac{(360°)}{7} = 51\frac{3}{7}° \approx 51.43°$

How to complete the Quick Check:

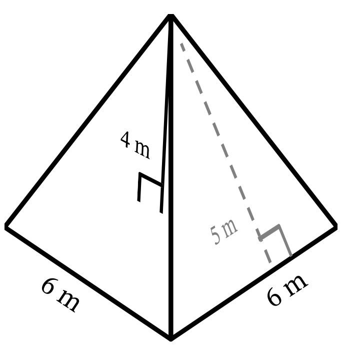
- You only need to complete the problems your parent or instructor assigns.

10.1

10.1a **Find the volume of a sphere with a radius of 7 centimeters.**

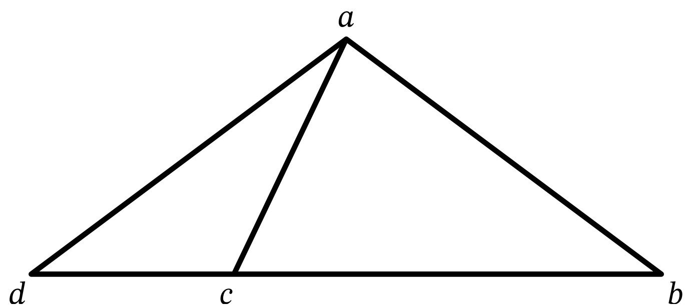


10.1b **Find the surface area of a square pyramid with a 6m × 6m base, an altitude of 4m, and a slant height of 5m.**

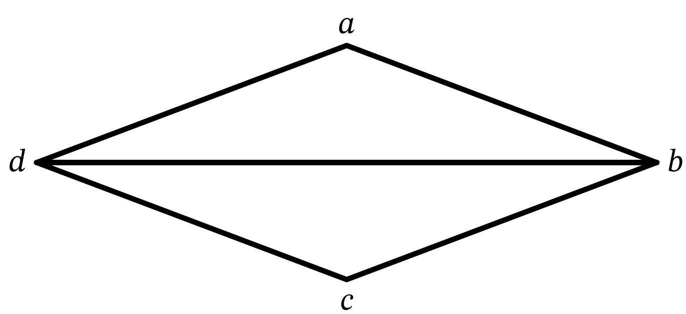


10.2

10.2a Prove that triangles $\triangle abd$ and $\triangle acd$ are similar using the diagram below and the angle-angle (AA) postulate, given that $\angle bad \cong \angle acd$.

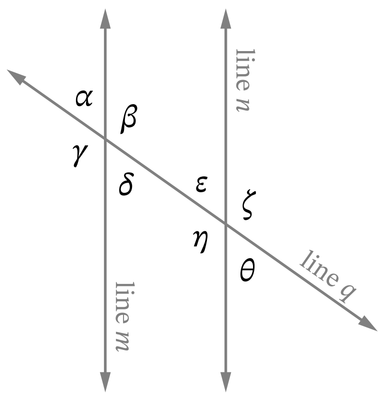


10.2b Prove that triangles $\triangle$abd and $\triangle$bcd are congruent using the side-angle-side (SAS) postulate, given that $\overleftrightarrow{ab} \cong \overleftrightarrow{cb}$ and $\overleftrightarrow{db}$ bisects $\angle$abc.



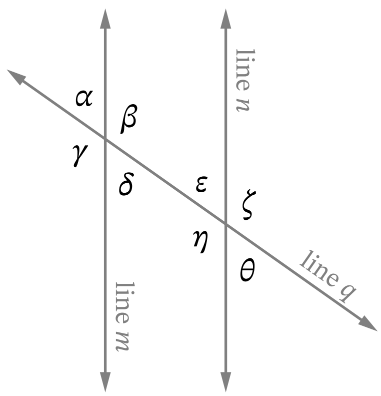
10.3

10.3a **Using the following diagram (not to scale), find the measure of angle α if line m is parallel to line n and the measure of angle θ is 30°.**



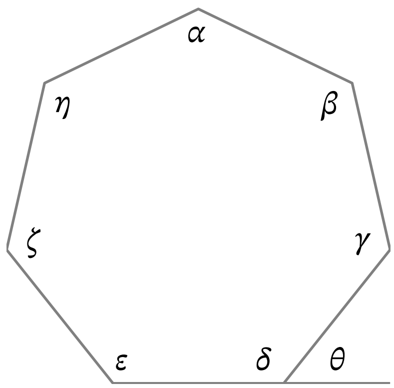
10.3

10.3b Using the same diagram, find the measure of angle δ if lines m and n are parallel and the measure of angle θ is 55°.



10.4

10.4a **Using the following diagram without measuring, calculate the measure of angle α assuming that the shape is a regular polygon (all seven sides are congruent).**



10.4a **Using the same diagram without measuring and assuming that the shape is a regular polygon, calculate the measure of angle θ.**