

Final Test — Form A

Answer key

HSG.CO

HSG.SRT

HSG.C

HSG.GPE

HSG.GMD

28 problems

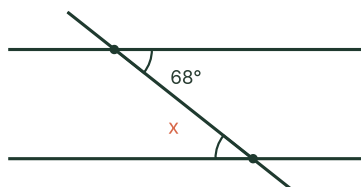
1. Two angles are complementary. One measures 58° . Find the measure of the other.

Answer 32° Complementary angles add to 90° : $90 - 58 = 32^\circ$.

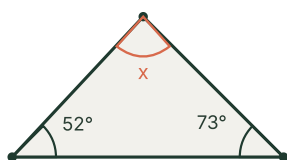
2. Find the value of x . The two angles form a straight line.

**Answer** $x = 55$ A linear pair adds to 180° : $x = 180 - 125 = 55^\circ$.

3. Lines m and n are parallel. The two marked angles are alternate interior angles. Find the value of x .

**Answer** $x = 68$ Alternate interior angles between parallel lines are equal, so $x = 68^\circ$.

4. Find the value of x in the triangle.

**Answer** $x = 55$ The three interior angles add to 180° : $x = 180 - 52 - 73 = 55^\circ$.

5. An exterior angle of a triangle is formed at one vertex. The two remote interior angles measure 64° and 53° . Find the measure of that exterior angle.

Answer 117° An exterior angle equals the sum of the two remote interior angles: $64 + 53 = 117^\circ$.

6. In triangles ABC and DEF , $AB = DE$, $\angle A = \angle D$, and $AC = DF$ (the equal angle lies between the two pairs of equal sides). Which congruence shortcut proves the triangles congruent?

Answer B) SAS

Two pairs of equal sides with the equal angle included between them is the Side-Angle-Side (SAS) shortcut.

7. Three angles of a quadrilateral measure 84° , 97° , and 113° . Find the measure of the fourth angle.

Answer 66°

The four angles of a quadrilateral sum to 360° : $360 - 84 - 97 - 113 = 66^\circ$.

8. Find the measure of each interior angle of a regular hexagon.

Answer 120°

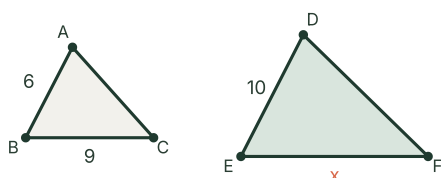
Sum = $(6 - 2) \cdot 180^\circ = 720^\circ$. Each angle = $\frac{720^\circ}{6} = 120^\circ$.

9. Each exterior angle of a regular polygon measures 36° . How many sides does the polygon have?

Answer C) 10

The exterior angles total 360° , so $n = \frac{360^\circ}{36^\circ} = 10$ sides.

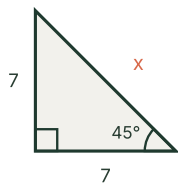
10. Triangle ABC is similar to triangle DEF . Use the matching sides to find x .



Answer $x = 15$

Matching sides give $\frac{AB}{DE} = \frac{BC}{EF}$, so $\frac{6}{10} = \frac{9}{x}$. Cross-multiply: $6x = 90$, $x = 15$.

11. Find the length of the hypotenuse x of this 45° - 45° - 90° triangle. Give an exact answer.



Answer $x = 7\sqrt{2}$

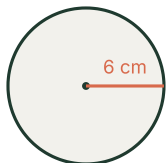
In a 45° - 45° - 90° triangle the hypotenuse is a leg times $\sqrt{2}$: $x = 7\sqrt{2}$.

12. A 30° - 60° - 90° triangle has a hypotenuse of 14. Find the short leg and the long leg in exact form.

Answer short leg = 7; long leg = $7\sqrt{3}$

The hypotenuse is $2s$, so the short leg is $s = 14 \div 2 = 7$. The long leg is $s\sqrt{3} = 7\sqrt{3}$.

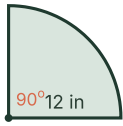
13. A circle has radius 6 cm. Find both its circumference and its area, in terms of π .



Answer $C = 12\pi$ cm; $A = 36\pi$ square cm

$C = 2\pi r = 2\pi(6) = 12\pi$ cm. $A = \pi r^2 = \pi(6)^2 = 36\pi$ square cm.

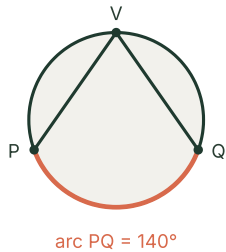
14. A central angle of 90° is drawn in a circle of radius 12 in. Find the length of its intercepted arc, in terms of π .



Answer 6π in

$$\text{Arc length} = \frac{90}{360} \cdot 2\pi(12) = \frac{1}{4} \cdot 24\pi = 6\pi \text{ in.}$$

15. In the circle, the inscribed angle at V intercepts arc PQ . Find $m\angle PVQ$.



Answer 70°

An inscribed angle is half its intercepted arc: $m\angle PVQ = \frac{1}{2}(140^\circ) = 70^\circ$.

16. Find the distance between $A(2, 1)$ and $B(7, 13)$.

Answer 13

$$d = \sqrt{(7-2)^2 + (13-1)^2} = \sqrt{5^2 + 12^2} = \sqrt{169} = 13.$$

17. Find the midpoint of the segment joining $(-4, 3)$ and $(8, -7)$.

Answer $(2, -2)$

$$\left(\frac{-4+8}{2}, \frac{3+(-7)}{2} \right) = \left(\frac{4}{2}, \frac{-4}{2} \right) = (2, -2).$$

18. Find the slope of the line through $(-2, 5)$ and $(4, -7)$.

Answer -2

$$m = \frac{-7-5}{4-(-2)} = \frac{-12}{6} = -2.$$

19. Point $A(5, -3)$ is reflected over the y -axis. Give the coordinates of its image A' .

Answer $A'(-5, -3)$

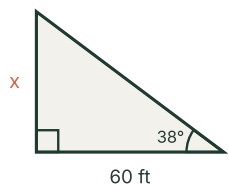
A reflection over the y -axis negates x and keeps y : $(5, -3) \rightarrow (-5, -3)$.

20. A rhombus has diagonals that meet at its center, splitting it into right triangles with legs 6 and 8 (half of each diagonal). Find the side length of the rhombus.

Answer 10

The diagonals of a rhombus are perpendicular, so each side is the hypotenuse of a right triangle with legs 6 and 8:
 $\sqrt{6^2 + 8^2} = \sqrt{100} = 10.$

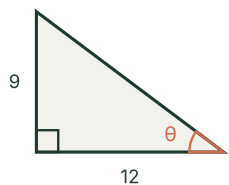
21. A surveyor sights the top of a flagpole. Write the trig equation and find x , the height of the flagpole. Round to the nearest tenth.



Answer $x \approx 46.9$ ft

Side x is opposite 38° and 60 is adjacent: $\tan 38^\circ = \frac{x}{60}$, so $x = 60 \tan 38^\circ \approx 46.9$ ft.

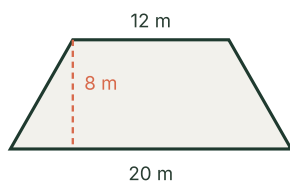
22. Find the measure of angle θ . Round to the nearest tenth.



Answer $\theta \approx 36.9^\circ$

9 is opposite θ and 12 is adjacent: $\tan \theta = \frac{9}{12}$, so $\theta = \tan^{-1}(0.75) \approx 36.9^\circ$.

23. Find the area of the trapezoid using $A = \frac{1}{2}(b_1 + b_2)h$.



Answer 128 square m

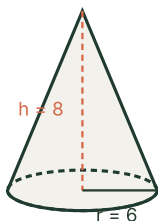
$$A = \frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(12 + 20)(8) = \frac{1}{2}(32)(8) = 128 \text{ square m.}$$

24. A closed cylinder has radius 4 ft and height 11 ft. Find its surface area in terms of π .

Answer 120π square ft

$$SA = 2\pi r^2 + 2\pi rh = 2\pi(4)^2 + 2\pi(4)(11) = 32\pi + 88\pi = 120\pi \text{ square ft.}$$

25. Find the volume of the cone in terms of π .



Answer 96π cubic cm

$$V = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(6)^2(8) = \frac{1}{3}\pi \cdot 36 \cdot 8 = 96\pi \text{ cubic cm.}$$

26. A contractor leans a 20-foot ladder against a wall so that it makes a 65° angle with the level ground. How far up the wall does the ladder reach? Round to the nearest tenth of a foot.

Answer ≈ 18.1 ft

The height up the wall is opposite the 65° angle and the ladder (20) is the hypotenuse: $\sin 65^\circ = \frac{h}{20}$, so $h = 20 \sin 65^\circ \approx 18.1$ ft.

27. A builder pours a cylindrical concrete footing with radius 5 ft and depth 3 ft. Find the volume of concrete needed, in terms of π .

Answer 75π cubic ft

$V = \pi r^2 h = \pi(5)^2(3) = \pi \cdot 25 \cdot 3 = 75\pi$ cubic ft.

28. A rectangular deck is 24 ft long and 10 ft wide. A carpenter runs a diagonal brace from one corner to the opposite corner. How long is the brace?

Answer 26 ft

The brace is the hypotenuse of a right triangle with legs 24 and 10: $\sqrt{24^2 + 10^2} = \sqrt{576 + 100} = \sqrt{676} = 26$ ft.