Check Your Understanding

Practise

Where necessary, round lengths to the nearest tenth of a unit and angle measures to the nearest degree.

1. Solve for the unknown side or angle in each.

a) $\dfrac{a}{\sin 35°} = \dfrac{10}{\sin 40°}$

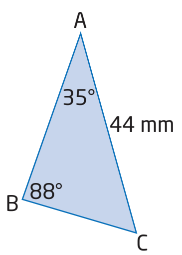
b) $\dfrac{b}{\sin 48°} = \dfrac{65}{\sin 75°}$

c) $\dfrac{\sin \theta}{12} = \dfrac{\sin 50°}{65}$

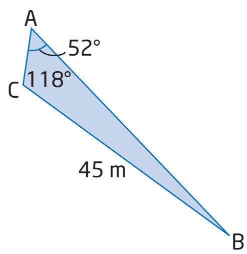
d) $\dfrac{\sin A}{25} = \dfrac{\sin 62°}{32}$

2. Determine the length of AB in each.

a)

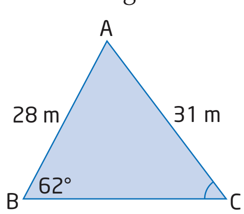


b)



3. Determine the value of the marked unknown angle in each.

a)



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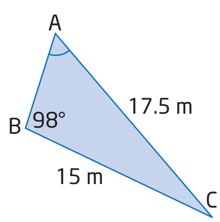
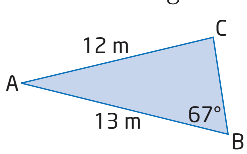


4. Determining the lengths of all three sides and the measures of all three angles is called solving a triangle. Solve each triangle.

a)



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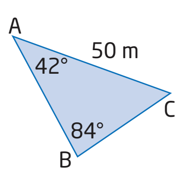

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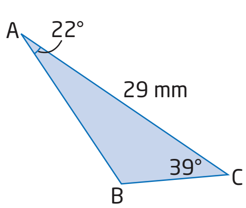
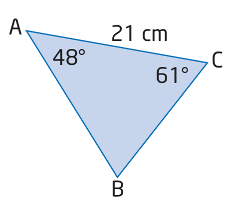


d)



5. Sketch each triangle. Determine the measure of the indicated side.

a) In △ABC, ∠A = 57°, ∠B = 73°, and AB = 24 cm. Find the length of AC.

b) In △ABC, ∠B = 38°, ∠C = 56°, and BC = 63 cm. Find the length of AB.

c) In △ABC, ∠A = 50°, ∠B = 50°, and AC = 27 m. Find the length of AB.

d) In △ABC, ∠A = 23°, ∠C = 78°, and AB = 15 cm. Find the length of BC.

6. For each triangle, determine whether there is no solution, one solution, or two solutions.

a) In △ABC, ∠A = 39°, a = 10 cm, and b = 14 cm.

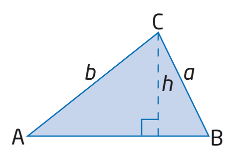
b) In △ABC, ∠A = 123°, a = 23 cm, and b = 12 cm.

c) In △ABC, ∠A = 145°, a = 18 cm, and b = 10 cm.

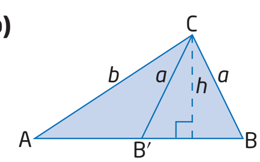
d) In △ABC, ∠A = 124°, a = 1 cm, and b = 2 cm.

7. In each diagram, h is an altitude. Describe how ∠A, sides a and b, and h are related in each diagram.

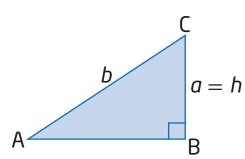
a)



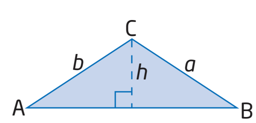
b)



c)



d)



b) The sine and cosine ratios are the same when A is at approximately (3.5355, 3.5355) and (−3.5355, −3.5355). This corresponds to 45° and 225°.

c) The sine ratio is positive in quadrants I and II and negative in quadrants III and IV. The cosine ratio is positive in quadrant I, negative in quadrants II and III, and positive in quadrant IV. The tangent ratio is positive in quadrant I, negative in quadrant II, positive in quadrant III, and negative in quadrant IV.

d) When the sine ratio is divided by the cosine ratio, the result is the tangent ratio. This is true for all angles as A moves around the circle.

2.3 The Sine Law, pages 108 to 113

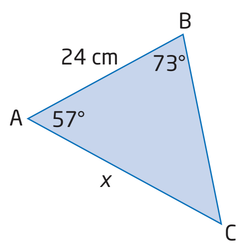
1. a) 8.9 **b)** 50.0
c) 8° **d)** 44°

2. a) 36.9 mm **b)** 50.4 m

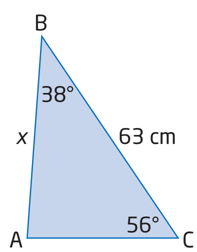
3. a) 53° **b)** 58°

4. a) ∠C = 86°, ∠A = 27°, a = 6.0 m or ∠C = 94°, ∠A = 19°, a = 4.2 m
b) ∠C = 54°, c = 40.7 m, a = 33.6 m
c) ∠B = 119°, c = 20.9 mm, a = 12.4 mm
d) ∠B = 71°, c = 19.4 cm, a = 16.5 cm

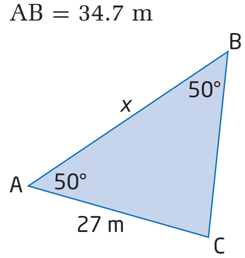
5. a) AC = 30.0 cm



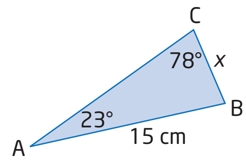
b) AB = 52.4 cm



c) AB = 34.7 m



d) BC = 6.0 cm



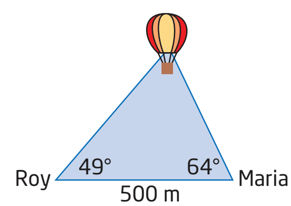
6. a) two solutions **b)** one solution
c) one solution **d)** no solutions

7. a) $a > b \sin A$, $a > h$, $b > h$
b) $a > b \sin A$, $a > h$, $a < b$
c) $a = b \sin A$, $a = h$
d) $a > b \sin A$, $a > h$, $a \geq b$

8. a) ∠A = 48°, ∠B = 101°, b = 7.4 cm or ∠A = 132°, ∠B = 17°, b = 2.2 cm
b) ∠P = 65°, ∠R = 72°, r = 20.9 cm or ∠P = 115°, ∠R = 22°, r = 8.2 cm
c) no solutions

9. a) $a \geq 120$ cm **b)** $a = 52.6$ cm
c) 52.6 cm < a < 120 cm
d) $a < 52.6$ cm

10. a)



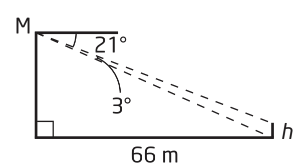
b) 409.9 m

11. 364.7 m

12. 41°

13. 4.5 m

14. a)



b) 4.1 m **c)** 72.2 m

15. a) 1.51 Å **b)** 0.0151 mm

16. least wingspan 9.1 m, greatest wingspan 9.3 m

17. a) Since $a < b$ (360 < 500) and $a > b \sin A$ (360 > 500 sin 35°), there are two possible solutions for the triangle.

b)