Trigonometric Applications
Unit Review

Below are the answers to the review exercises for the unit test on trigonometric applications. You are also encouraged to review previous unit quizzes and assignments (including the worksheets on area and the Bermuda Triangle).

Chapter 7 Review Problems
pg 693: 1-15 (odd), 17-21

1) This is AAS – find the missing angle, then use the Law of Sines to find the missing sides.

$A = 70°$	$a = 12$
$B = 55°$	$b = 10.5$
$C = 55°$	$c = 10.5$

3) This is SAS – use the Law of Cosines to find the missing side, then use the Law of Sines to find the smaller of the two remaining angles.

$A = 71.9°$	$a = 17$
$B = 66°$	$b = 16.3$
$C = 42.1°$	$c = 12$

5) This is ASA – find the missing angle, then use the Law of Sines to find the missing sides.

$A = 35°$	$a = 45.0$
$B = 25°$	$b = 33.2$
$C = 120°$	$c = 68$

7) This is SSA – use the Law of Sines to find one missing angle. That angle does not exist, so the triangle with the given sides does not exist.
no triangle / *no solution*

9) This is SSS – use the Law of Cosines to find the largest angle, then use the Law of Sines to find a second angle.

$A = 39.4°$	$a = 26.1$
$B = 78.0°$	$b = 40.2$
$C = 62.6°$	$c = 36.5$

11) This is SSA – use the Law of Sines to find one missing angle, then use the Law of Sines with the last angle to find the remaining side.

$A = 59.1°$ $a = 12.4$
$B = 37°$ $b = 8.7$
$C = 83.9°$ $c = 14.4$

Since this is the ambiguous case, check for two solutions. Find the supplement of the first angle found ($A_2 = 180° - A = 120.9°$) and see if a second triangle can exist. There would be room for a third angle ($C_2 = 180° - 37° - 120.9° = 22.1°$), so there is a second solution.

$A_2 = 120.9°$ $a_2 = 12.4$
$B_2 = 37°$ $b_2 = 8.7$
$C_2 = 22.1°$ $c_2 = 5.4$

13) This is SAS – use the formula $Area = \frac{1}{2}ab\sin C$.

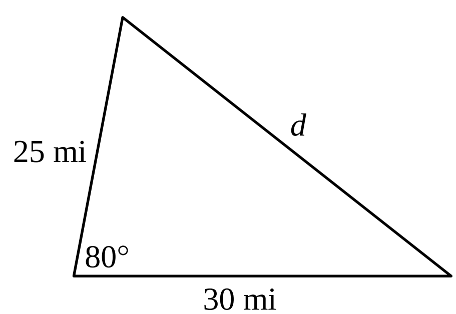
$$Area = \frac{1}{2}\cdot 4\cdot 6\cdot \sin 42° = 8.0\ \text{ft}^2$$

15) This is SSS – use Heron's formula $Area = \sqrt{s(s-a)(s-b)(s-c)}$, where s is the semiperimeter.

$$s = \frac{2+4+5}{2} = 5.5$$
$$Area = \sqrt{5.5(5.5-2)(5.5-4)(5.5-5)} = 3.8\ \text{m}^2$$

17) This is an equilateral triangle, so all sides must be equal. Since the base is 35 ft, so is the length of the roof. Alternately, you could use the Law of Sines to find the roof's length since you are given ASA.

18) The first car travels (60 mi/hr)(0.5 hr) = 30 mi and the second car travels (50 mi/hr)(0.5 hr) = 25 miles. Sketch a picture of the given scenario, labeling the known and unknown quantities.

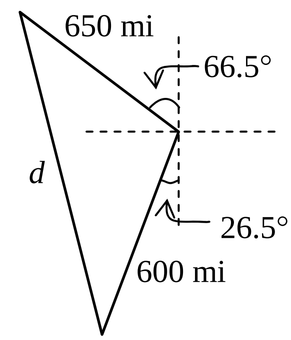


This is SAS. Use the Law of Cosines to find the missing side, d.

$$d^2 = 30^2 + 25^2 - 2\cdot 30\cdot 25\cdot \cos 80° = 1264.528 \quad \Rightarrow \quad d = 35.560$$

The cars are 35.6 miles from each other.

19) The first plane travels 650 miles in two hours and the second plane travels 600 miles. Sketch a picture of the given scenario, labeling the known and unknown quantities.



From the given bearings, the angle opposite side *d* is $180° - 66.5° - 26.5° = 87°$.

Now this is SAS. Use the Law of Cosines to find the missing side, *d*.

$$d^2 = 650^2 + 600^2 - 2 \cdot 650 \cdot 600 \cdot \cos 87° = 741{,}677.954 \quad \Rightarrow \quad d = 861.207$$

The planes are 861.2 miles from each other.

20) This is AAS, so find the missing angle ($180° - 55° - 46° = 79°$) and use the Law of Sines to find the remaining sides.

$$\frac{\sin 46°}{x} = \frac{\sin 55°}{460} \quad \Rightarrow \quad x = \frac{460 \sin 46°}{\sin 55°} = 403.950$$

$$\frac{\sin 79°}{y} = \frac{\sin 55°}{460} \quad \Rightarrow \quad y = \frac{460 \sin 79°}{\sin 55°} = 551.239$$

The left side (opposite the 46° angle) is 404.0 feet. The bottom side is 551.2 feet.

21) First find the area using Heron's formula (since SSS is given).

$$s = \frac{260 + 320 + 450}{2} = 515$$

$$Area = \sqrt{515(515-260)(515-320)(515-450)} = 40{,}798.828$$

Now multiply the footage by the cost per square foot.

$(40{,}978.8 \text{ ft}^2)(5.25 \text{ dollars/ft}^2) = 214{,}193.848$ dollars

The total cost is $214,193.85.