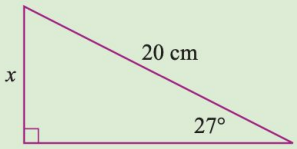
Walt use trig ratios to calculate the sides
Success Criteria I know the ratios and I can identify sides and use the correct ratio to find sides.

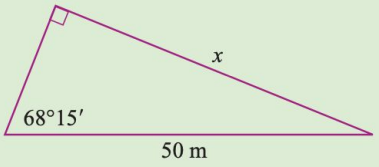
Using trigonometry to find sides

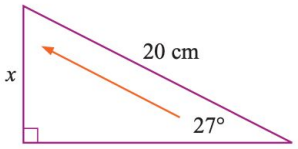
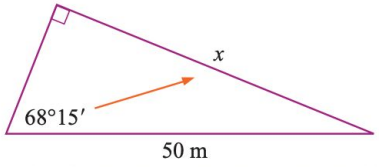
Use the sine ratio to find the value of x correct to 1 decimal place.

a



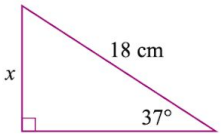
b



	Solve	Think	Apply
a	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\sin 27° = \frac{x}{20}$ $\therefore x = 20 \sin 27°$ ≈ 9.1 cm	 20 × sin 27 =	x is opposite the given angle in both triangles. The sine ratio is used when the opposite side and hypotenuse are the sides given. When finding the opposite side, multiply the hypotenuse by the sine of the angle.
b	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\sin 68°15' = \frac{x}{50}$ $\therefore x = 50 \sin 68°15'$ ≈ 46.4 m	 50 × sin 68 DMS 15 DMS =	

1 Use the sine ratio to find the value of x correct to 1 decimal place.

a



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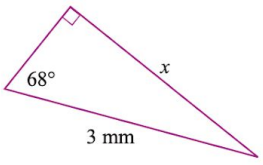

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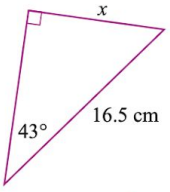

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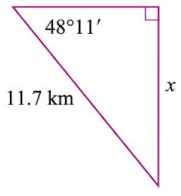

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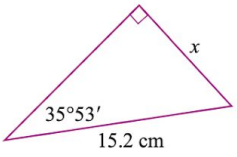

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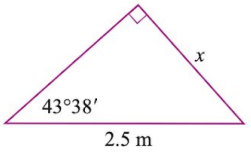

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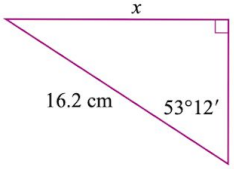

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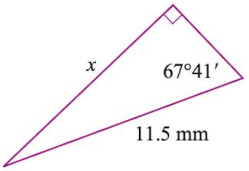
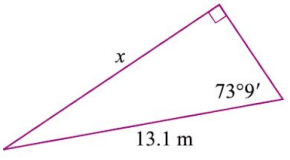
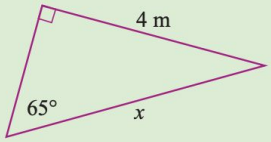


i



Use the sine ratio to find the length of the hypotenuse correct to 1 decimal place.

a



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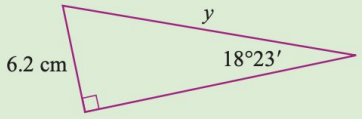
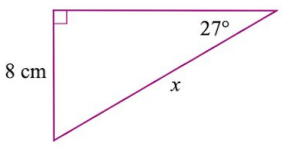


	Solve	Think	Apply
a	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\sin 65° = \frac{4}{x}$ $x \sin 65° = 4$ $\therefore x = \frac{4}{\sin 65°}$ $= 4.413\ldots$ ≈ 4.4 m	x is the hypotenuse. 4 ÷ sin 65 =	When finding the hypotenuse, divide the opposite side by the sine of the angle. Enter degrees and minutes using the DMS key.
b	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\sin 18°23' = \frac{6.2}{y}$ $y \sin 18°23' = 6.2$ $\therefore y = \frac{6.2}{\sin 18°23'}$ $= 19.659\ldots$ ≈ 19.7 cm	y is the hypotenuse. 6.2 ÷ sin 18 DMS 23 =	

2 Use the sine ratio to find the length of the hypotenuse correct to 1 decimal place.

a



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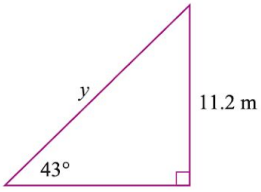

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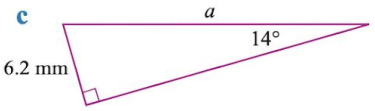

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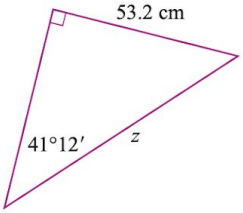

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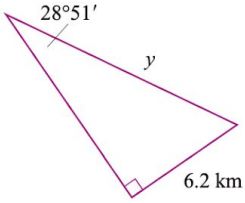

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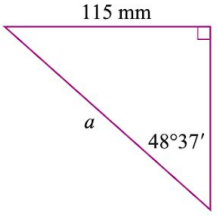
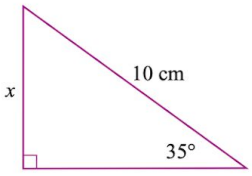


3 Find the unknown sides correct to 1 decimal place.

a



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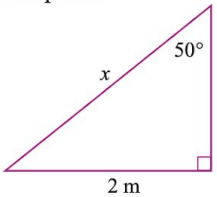

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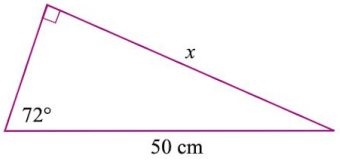

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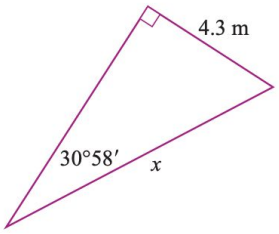

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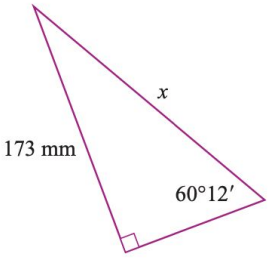

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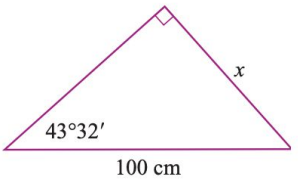
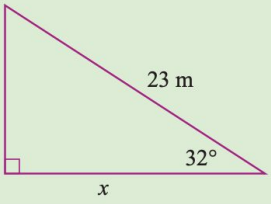
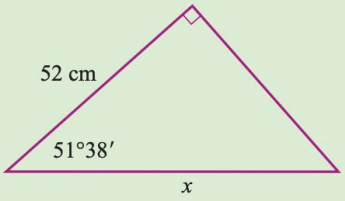


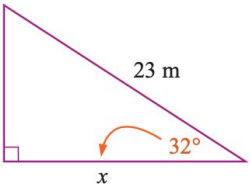
Use the cosine ratio to find the value of x correct to 1 decimal place.

a



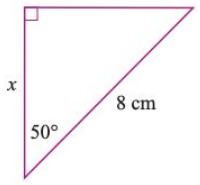
b



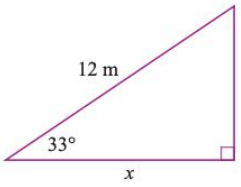
	Solve	Think	Apply
a	$\cos\theta = \dfrac{\text{adjacent}}{\text{hypotenuse}}$ $\cos 32° = \dfrac{x}{23}$ $\therefore x = 23 \cos 32°$ $= 19.505\ldots$ ≈ 19.5 m	x is adjacent to the given angle.  23 × cos 32 =	The cosine ratio is used when the adjacent side and hypotenuse are the sides given. As with sine, multiply when finding the adjacent side and divide by the cosine of the angle when finding the hypotenuse.
b	$\cos\theta = \dfrac{\text{adjacent}}{\text{hypotenuse}}$ $\cos 51°38' = \dfrac{52}{x}$ $\therefore x = \dfrac{52}{\cos 51°38'}$ $= 83.777\ldots$ ≈ 83.8 cm	x is the hypotenuse. 52 ÷ cos 51 DMS 38 DMS =	

4 Use the cosine ratio to find the value of x correct to 1 decimal place.

a



b



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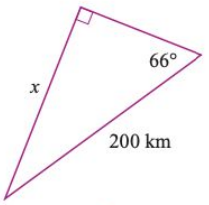

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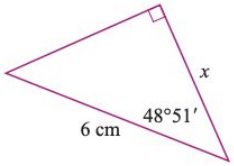

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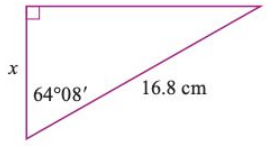

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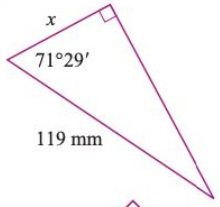

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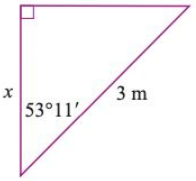

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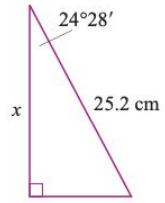

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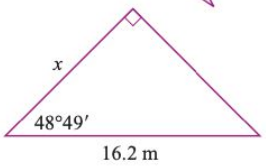
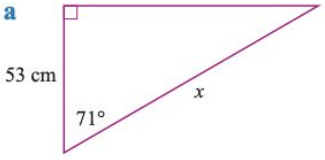


5 Use the cosine ratio to find the length of the hypotenuse correct to 1 decimal place.

a



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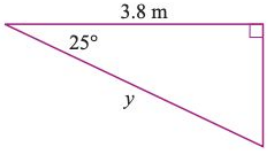

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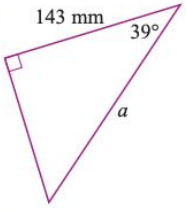

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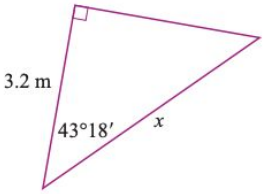

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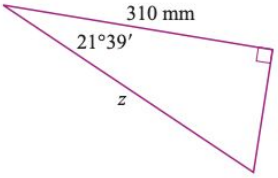

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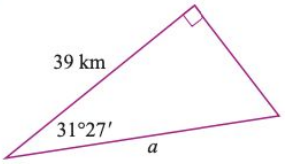
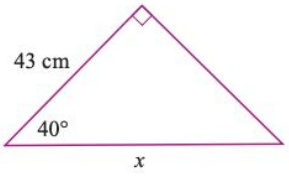


6 Find the unknown sides correct to 1 decimal place.

a



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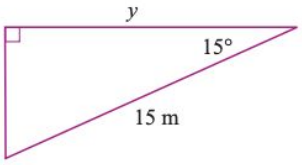

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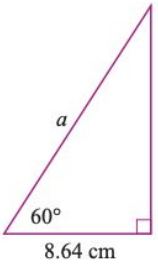

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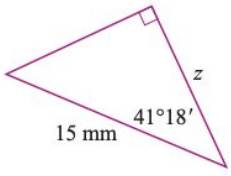

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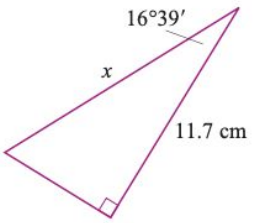

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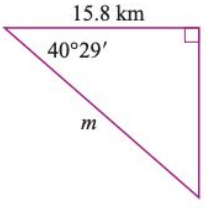
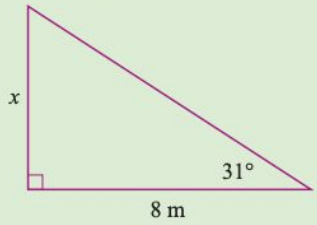


Use the tangent ratio to find the value of x correct to 1 decimal place.

a



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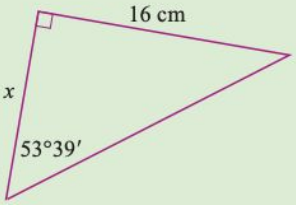
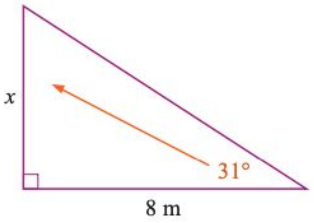
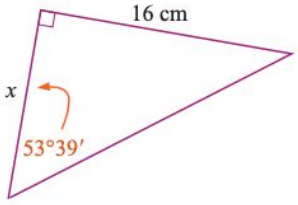
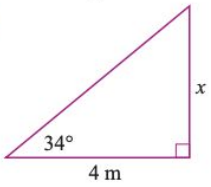


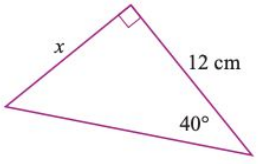
	Solve	Think	Apply
a	$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$ $\tan 31° = \frac{x}{8}$ $\therefore x = 8 \tan 31°$ $= 4.806\ldots$ ≈ 4.8 m	x is opposite the given angle.  8 × tan 31 =	The tangent ratio is used when the hypotenuse is not given. Identify the opposite and adjacent sides. When finding the opposite side, multiply the side and the tangent of the angle. When finding the adjacent side, divide by the tangent of the angle.
b	$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$ $\tan 53°39' = \frac{16}{x}$ $\therefore x = \frac{16}{\tan 53°39'}$ $= 11.774\ldots$ ≈ 11.8 cm	x is adjacent to the given angle.  16 ÷ tan 53 DMS 39 DMS =	

7 Use the tangent ratio to find the value of x correct to 1 decimal place.

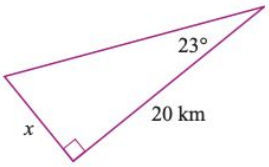
a



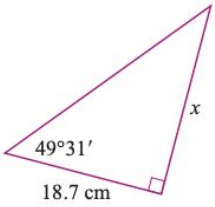
b



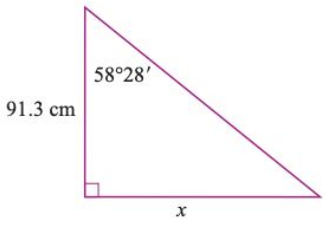
c



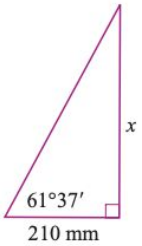
d



e

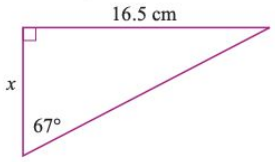


f

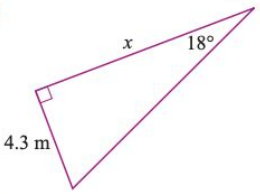


8 Use the tangent ratio to find the value of x correct to 1 decimal place.

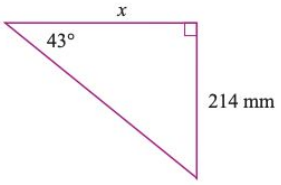
a



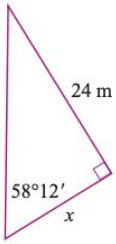
b



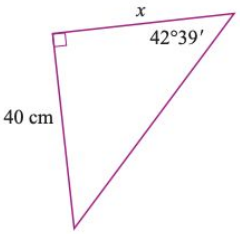
c



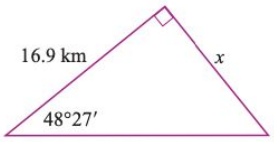
d



e

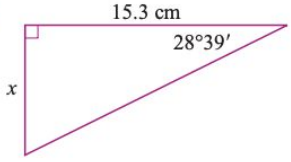


f

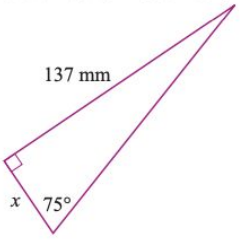


9 Use the tangent ratio to find the value of x correct to 1 decimal place.

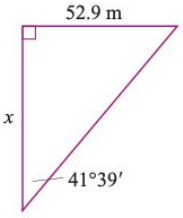
a



b

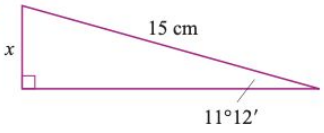


c

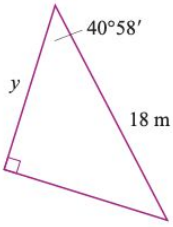


10 Use the sine, cosine or tangent ratios to find each unknown side correct to 1 decimal place.

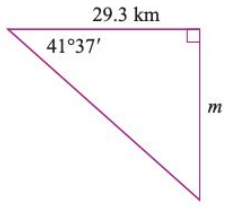
a



b

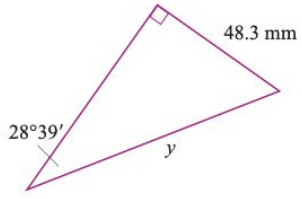


c

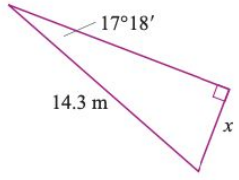


d

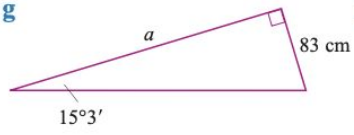
e



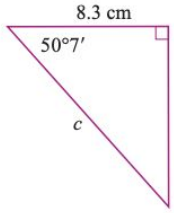
f



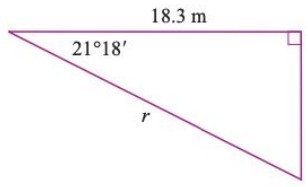
g



h



i



Check your answers

1	**a** 10.8 cm	**b** 2.8 mm	**c** 11.3 cm
	d 8.7 km	**e** 8.9 cm	**f** 1.7 m
	g 13.0 cm	**h** 10.6 mm	**i** 12.5 m
2	**a** 17.6 cm	**b** 16.4 m	**c** 25.6 mm
	d 80.8 cm	**e** 12.8 km	**f** 153.3 mm
3	**a** 5.7 cm	**b** 2.6 m	**c** 47.6 cm
	d 8.4 m	**e** 199.4 mm	**f** 68.9 cm
4	**a** 5.1 cm	**b** 10.1 m	**c** 81.3 km
	d 3.9 cm	**e** 7.3 cm	**f** 37.8 mm
	g 1.8 m	**h** 22.9 cm	**i** 10.7 m
5	**a** 162.8 cm	**b** 4.2 m	**c** 184.0 mm
	d 4.4 m	**e** 333.5 mm	**f** 45.7 km
6	**a** 56.1 cm	**b** 14.5 m	**c** 17.3 cm
	d 11.3 mm	**e** 12.2 cm	**f** 20.8 km
7	**a** 2.7 m	**b** 10.1 cm	**c** 8.5 km
	d 21.9 cm	**e** 148.8 cm	**f** 388.7 mm
8	**a** 7.0 cm	**b** 13.2 m	**c** 229.5 mm
	d 14.9 m	**e** 43.4 cm	**f** 15.0 km
9	**a** 8.4 cm	**b** 36.7 mm	**c** 59.5 m
10	**a** 2.9 cm	**b** 13.6 m	**c** 26.0 km
	d 48.1 m	**e** 100.7 mm	**f** 4.3 m
	g 308.7 cm	**h** 12.9 cm	**i** 19.6 m