Use the tangent ratio to find missing side lengths

1 Solve the equations.

a) $5x = 83$

$x = \boxed{\dfrac{83}{5}}$

c) $83 = \dfrac{x}{5}$

$x = \boxed{415}$

b) $5 = \dfrac{83}{x}$
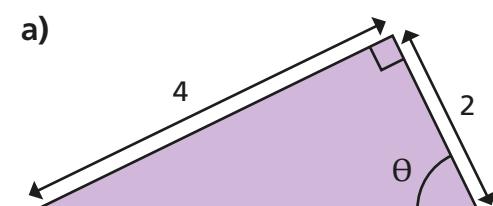
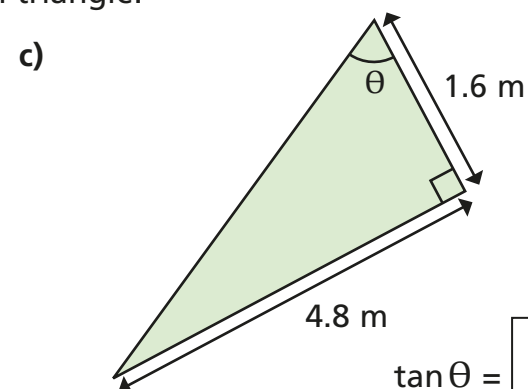$x = \boxed{\dfrac{83}{5}}$

d) $5 = \dfrac{x}{83}$

$x = \boxed{415}$

What is the same and what is different about the equations?

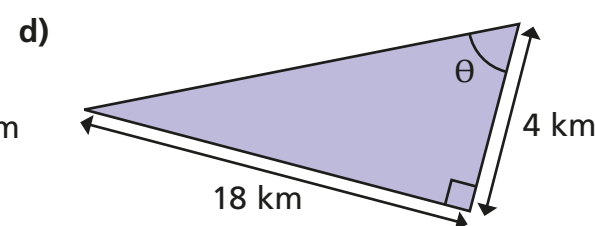**2** Work out the value of $\tan\theta$ for each triangle.

a)

4, 2, θ

$\tan\theta = \boxed{2}$

c)

θ, 1.6 m, 4.8 m

$\tan\theta = \boxed{3}$

b)

10 cm, θ, 50 cm

$\tan\theta = \boxed{\dfrac{1}{5}}$

d)

θ, 4 km, 18 km
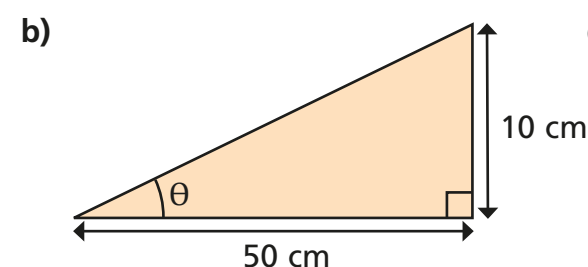
$\tan\theta = \boxed{\dfrac{9}{2}}$

3 Work out the values using a calculator.

Give your answers to 2 decimal places.
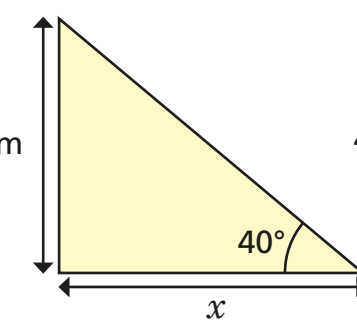
a) $\tan 32° = \boxed{0.62}$

c) $\tan 84° = \boxed{9.51}$

b) $\tan 47° = \boxed{1.07}$

d) $\tan 9° = \boxed{0.16}$

4 Match the diagrams to the equations.

x, 50 cm, 40°

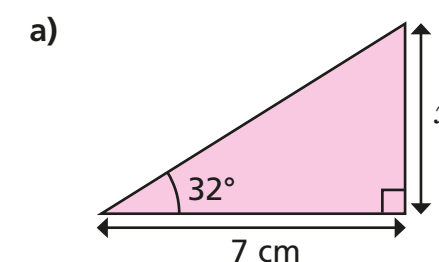50 cm, 40°, x

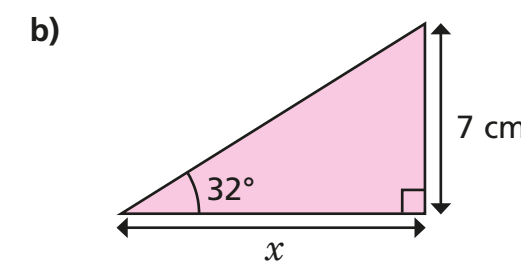50°, 40 cm, x
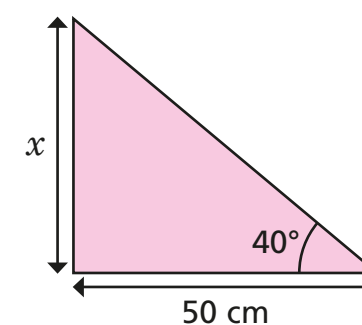
$\tan 40° = \dfrac{x}{50}$

$\tan 50° = \dfrac{x}{40}$
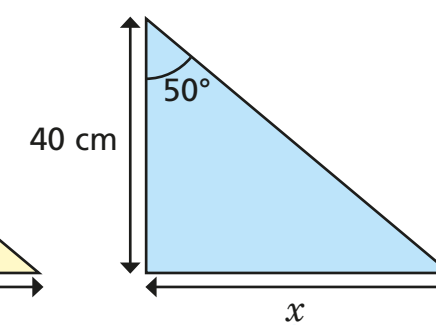
$\tan 40° = \dfrac{50}{x}$

5 Work out the lengths of the sides labelled x.

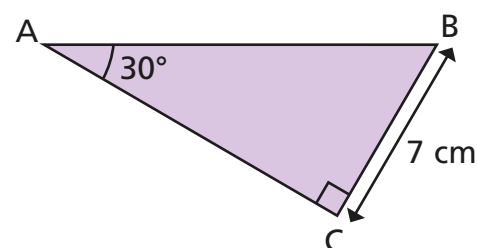Give your answers to 3 significant figures.

a)

32°, x, 7 cm

$\tan 32 = \dfrac{x}{7}$

$x = \boxed{4.37 \text{ cm}}$

b)

32°, 7 cm, x

$\tan 32 = \dfrac{7}{x}$

$x = \boxed{11.2 \text{ cm}}$

6 Filip is calculating the length of AC.

Here are his workings.

A   30°   B

7 cm

C

$\tan 30° = \dfrac{AC}{7}$

$AC = 7 \times \tan 30°$

$= 4.04$ cm (to 2 d.p.)

Do you agree with Filip? __No__
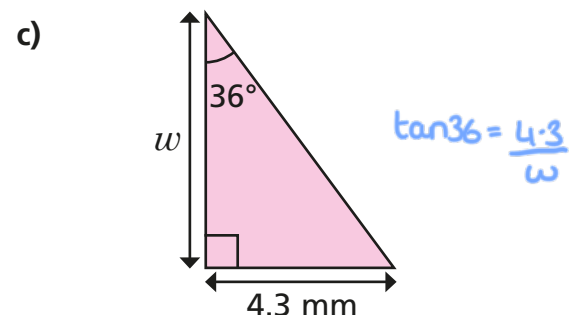
Explain your answer.

He has done adjacent divided by opposite when it should
be opposite divided by adjacent.

7 Find the unknown lengths.
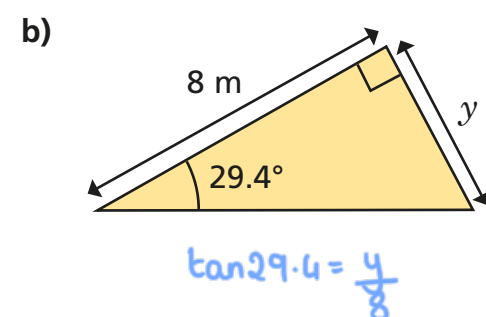
Give your answers rounded to 1 decimal place.

a)

x

19 cm

28°

$\tan 28 = \dfrac{x}{19}$

$x = \boxed{10.1}$ cm

b)

8 m

y

29.4°

$\tan 29.4 = \dfrac{y}{8}$

$y = \boxed{4.5}$ m

c)

36°

w

4.3 mm

$\tan 36 = \dfrac{4.3}{w}$

$w = \boxed{5.9}$ mm

d)

19.7 km

z   24°
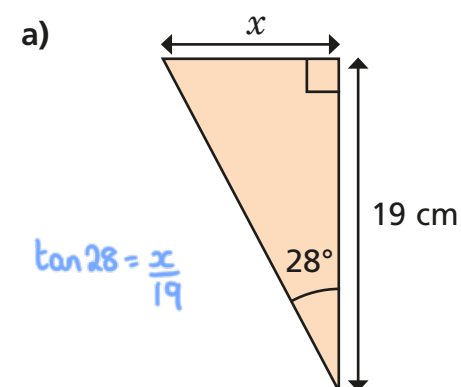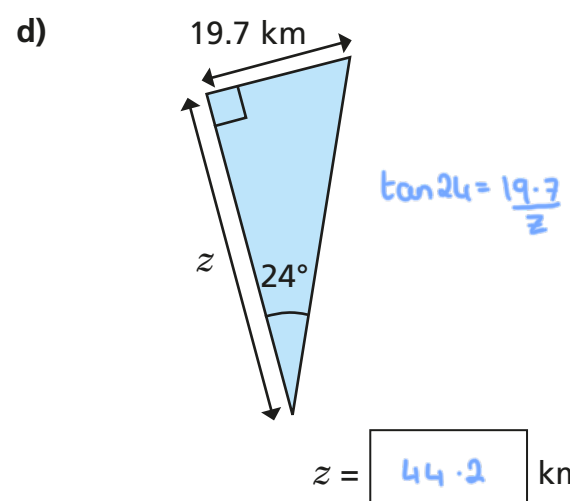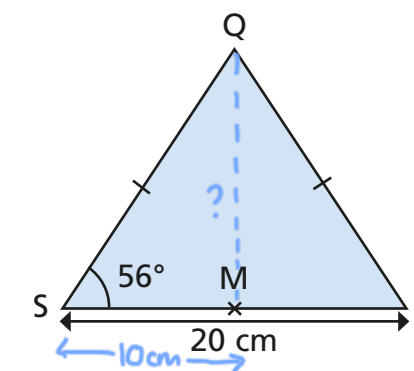
$\tan 24 = \dfrac{19.7}{z}$

$z = \boxed{44.2}$ km

8 QRS is an isosceles triangle.

M is the midpoint of RS.

Find the distance between Q and M, giving your answer to 1 decimal place.

Q

S   56°   M   R
←10cm→ 20 cm

$\tan 56 = \dfrac{?}{10}$

$QM = \boxed{14.8 \text{ cm}}$

9 A farmer wants to build a fence around the perimeter of a rectangular field.
The length of the field is 23.4 m.

A straight path runs diagonally between two opposite corners of the field.

The angle between the length and the path is 35°.

?

23.4 m

35°
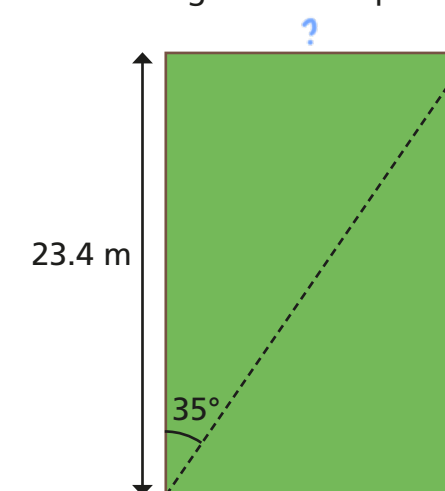
What is the total length of fencing that the farmer requires?

$\tan 35 = \dfrac{?}{23.4}$

$? = 16.4$ m

$\boxed{79.6 \text{ m}}$