education equals

Topic: Right Angled Triangles

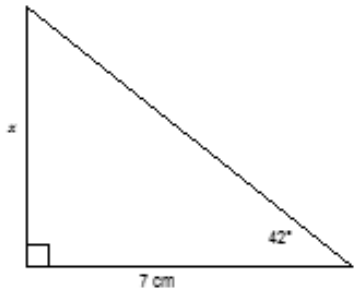
Time: 45 mins Marks: /45 marks

Calculator assumed

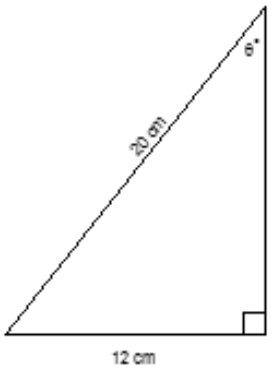
Question One: [2, 2, 3, 2: 9 marks]

Calculate the value of the unknown side or angle in each of the following right-angled triangles.

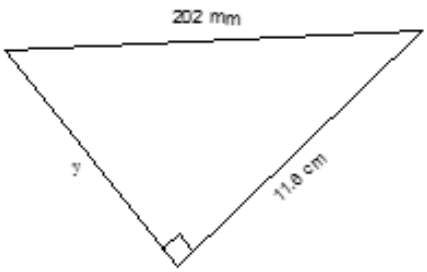
a)



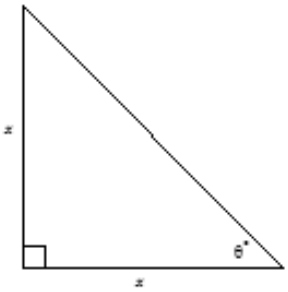
b)



c)



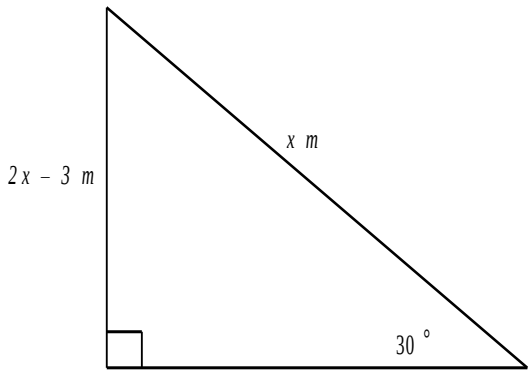
d)



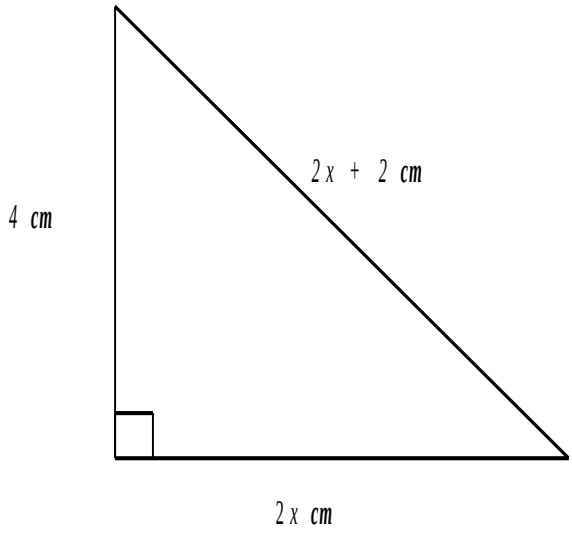
Question Two: [3, 3: 6 marks]

Determine the length of **each** side in the following triangles, showing all working.

a)



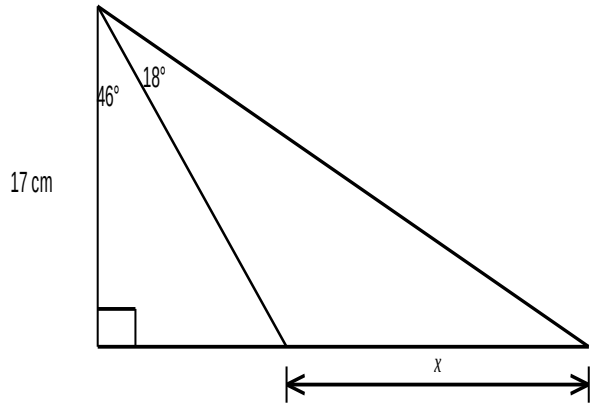
b)



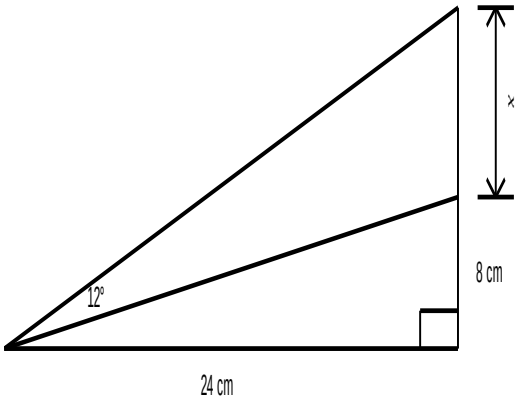
Question Three: [4, 4: 8 marks]

Calculate the value of x in the following diagrams.

a)

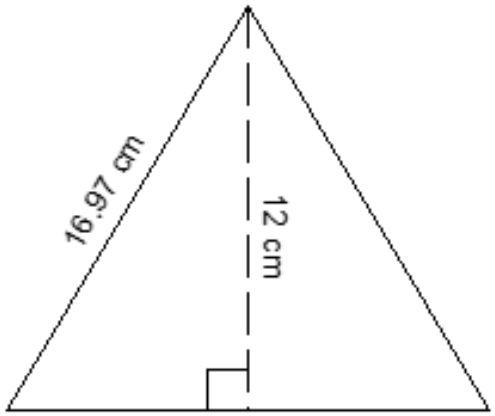


b)

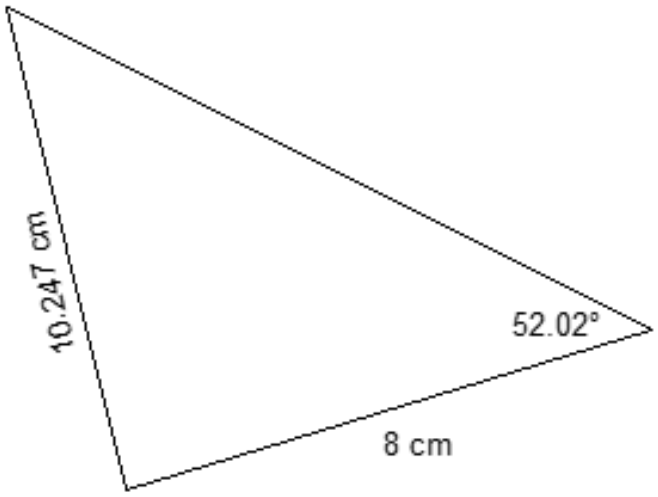


Question Four: [3, 3: 6 marks]

a) Is this triangle equilateral? Show working to justify your answer.



b) Is this triangle a right-angled triangle? Show working to justify your answer.



Question Five: [2, 2, 4: 8 marks]

A telephone pole is held secure with two guy ropes. One rope is attached 1 m from the top of the pole and is fastened to the ground 2.4m from the base of the pole. The angle between the wire and the pole at the point of connection is 34 degrees. A second rope is fastened to the ground 3.1m from the base of the pole and attaches to the top of the pole with an angle of elevation of 50 degrees.

a) Draw a diagram to represent this situation.

b) Determine the length of the telephone pole.

c) Determine the total length of guy wires required to support this pole.

Question Six: [2, 2, 1, 3: 8 marks]

A children's slide at the park can have a maximum angle of elevation of 31 degrees according to council regulations.

A 2.5m slide is erected in a park with the maximum slope.

a) Draw a diagram of this slide.

b) Determine the height of the slide.

The playground engineer wants to make a second slide. He wants it to be 1.3m high and 2.2m long.

c) Draw a diagram of this slide.

d) Does this second slide pass council regulations?

Topic: Right Angled Triangles
SOLUTIONS

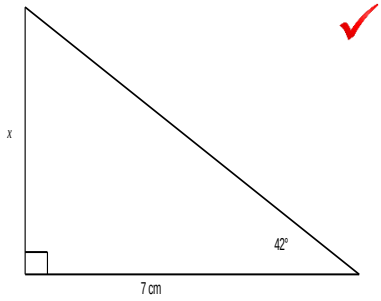
Time: 45 mins Marks: /45 marks

Calculator assumed

Question One: [2, 2, 3, 2: 9 marks]

Calculate the value of the unknown side or angle in each of the following right-angled triangles.

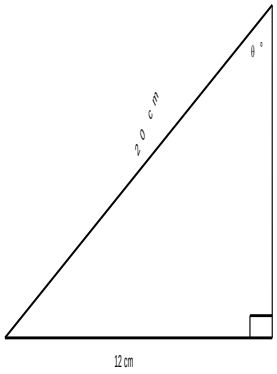
a)



✓ $tan\ 42° = \frac{x}{7}$

✓ $x = 6.3cm$

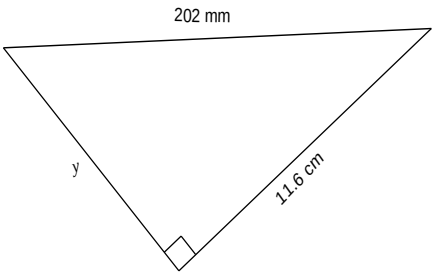
b)



$sin\ \theta = \frac{12}{20}$ ✓

$\theta = 36.87$ ✓

c)

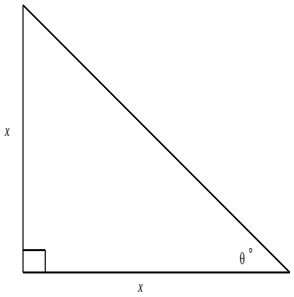


✓

$20.2^2 = 11.6^2 + y^2$ ✓

$y = 16.54cm$ ✓

d)

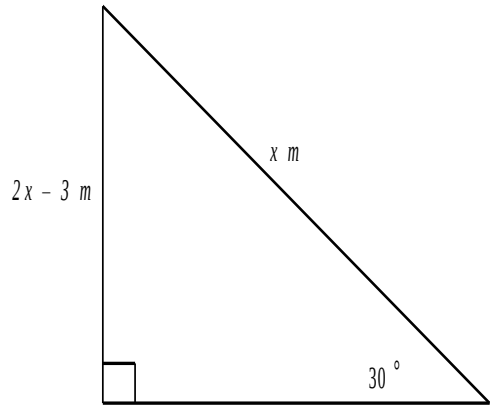


$\theta = 45°$ ✓ ✓

Question Two: [3, 3: 6 marks]

Determine the length of **each** side in the following triangles.

a)

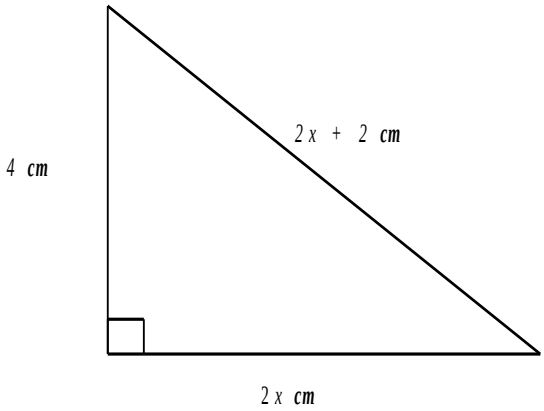


$$sin30° = \frac{2x-3}{x}$$ ✓

$$x = 2$$ ✓

side lengths are $1m, 2m$ *and* $1m$ ✓

b)



$$(2x+2)^2 = 4^2 + (2x)^2$$ ✓

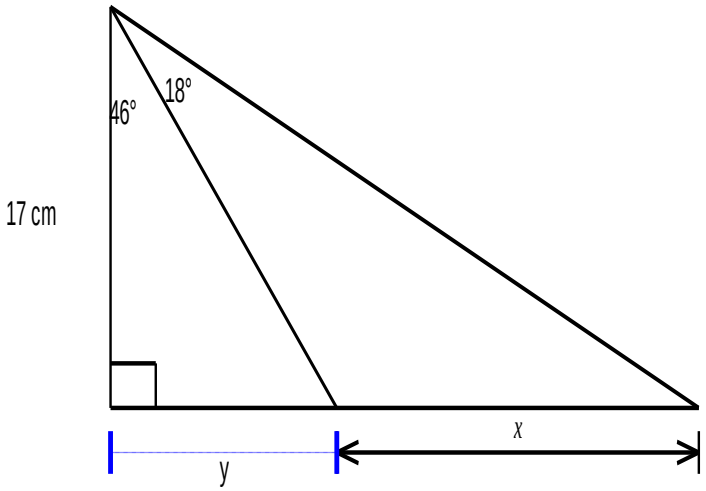
$$x = 1.5$$ ✓

side lengths are $3cm, 4cm$ *and* $5cm$ ✓

Question Three: [4, 4: 8 marks]

Calculate the value of x in the following diagrams.

a)



$tan46° = \frac{y}{17}$ ✓

$17 \times tan46° = y$

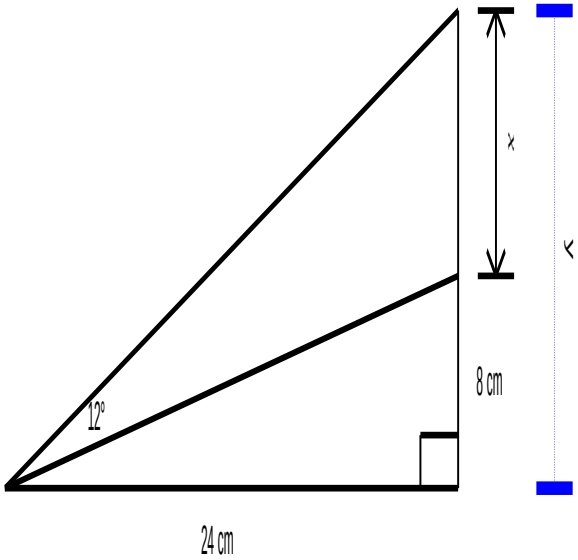
$y = 17.604cm$ ✓

$tan64° = \frac{y+x}{17}$ ✓

$y + x = 34.855$

$x = 17.25cm$ ✓

b)



$tan\theta = \frac{8}{24}$ ✓

$\theta = 18.43°$ ✓

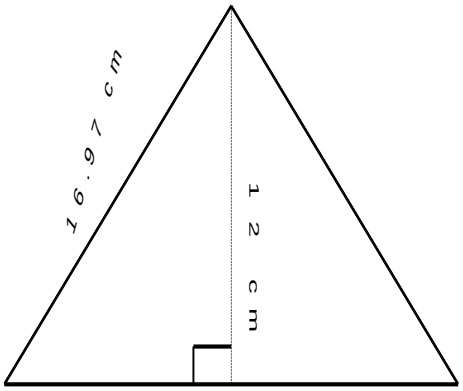
$tan30.43° = \frac{y}{24}$

$y = 14.1cm$ ✓

$x = 6.1cm$ ✓

Question Four: [3, 3: 6 marks]

a) Is this triangle equilateral? Show working to justify your answer.

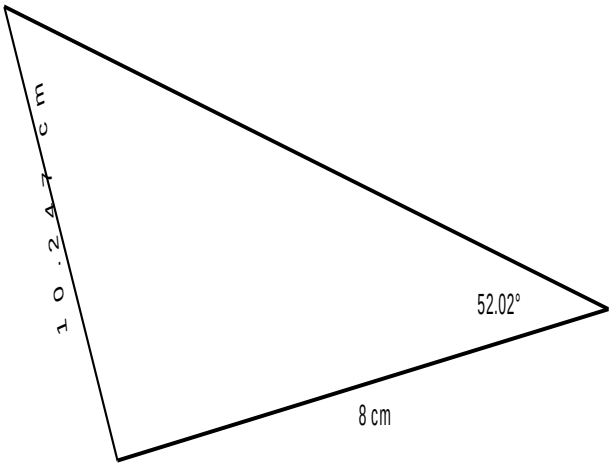


$16.97^2 = 12^2 + x^2$ ✓

$x = 12cm$ ✓

$Not\ equilateral, base = 24cm, not\ 16.97cm$ ✓

b) Is this triangle a right angled triangle? Show working to justify your answer.



$tan52.02° = 1.28$ ✓

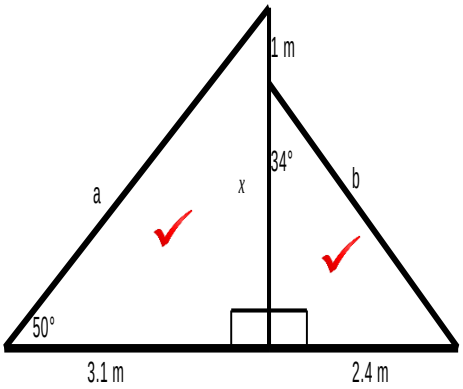
$\frac{O}{A} = \frac{10.247}{8} = 1.28$ ✓

$\therefore$ *yes the triangle is right angled* ✓

Question Five: [2, 2, 4: 8 marks]

A telephone pole is held secure with two guy ropes. One rope is attached 1 m from the top of the pole and is fastened to the ground 2.4m from the base of the pole. The angle between the wire and the pole at the point of connection is 34 degrees. A second rope is fastened to the ground 3.1m from the base of the pole and attaches to the top of the pole with an angle of elevation of 50 degrees.

a) Draw a diagram to represent this situation.



b) Determine the length of the telephone pole.

$tan50° = \frac{x}{3.1}$ ✓

$x = 3.69m$ ✓

c) Determine the total length of guy wires required to support this pole.

$a^2 = 3.1^2 + 3.69^2$ $b^2 = 2.4^2 + 2.69^2$ ✓

$a = 4.82m$ ✓ $b = 3.61m$ ✓

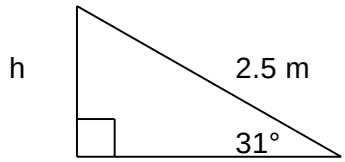
$a + b = 8.43m$ ✓

Question Six: [2, 2, 1, 3: 8 marks]

A children's slide at the park can have a maximum angle of elevation of 31 degrees according to council regulations.

A 2.5m slide is erected in a park with the maximum slope.

a) Draw a diagram of this slide.



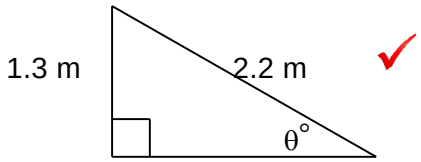
b) Determine the height of the slide.

$sin31° = \frac{h}{2.5}$

$h = 1.29m$

The playground engineer wants to make a second slide. He wants it to be 1.3m high and 2.2m long.

c) Draw a diagram of this slide.



d) Does this second slide pass council regulations?

$sin\theta = \frac{1.3}{2.2}$

$\theta = 36.22°$

$No, it\ is\ too\ steep$