Name:

Exam Style Questions

Pythagoras

Corbettmaths

Equipment needed: Calculator, pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

www.corbettmaths.com/contents

Video 257

Answers and Video Solutions

1. Shown below is a right angled triangle.

a
6cm

x c
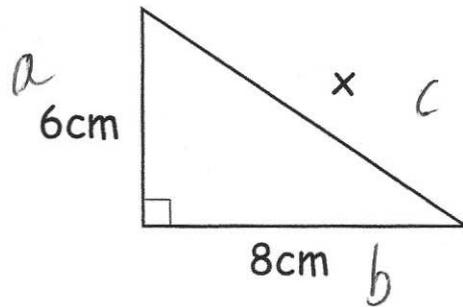
Not drawn accurately

8cm b

Use Pythagoras' theorem to work out the value of x.

$$a^2 + b^2 = c^2$$
$$6^2 + 8^2 = x^2$$
$$36 + 64 = x^2$$
$$100 = x^2$$
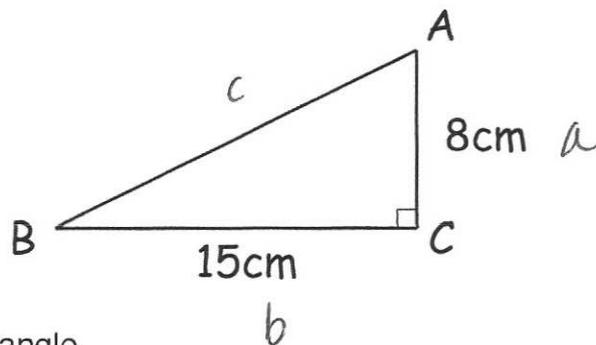
$$\sqrt{100} = 10$$

___10___ cm

(3)

2.

Not drawn accurately

A

c

8cm a

B

15cm

C

b

ABC is a right angled triangle.

AC = 8cm
BC = 15cm

Calculate the length of AB.

$$a^2 + b^2 = c^2$$
$$8^2 + 15^2 = c^2$$
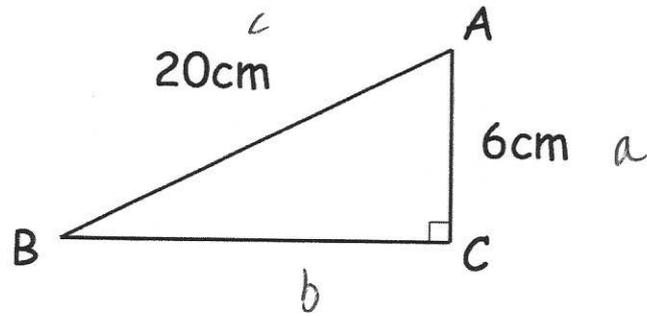$$64 + 225 = c^2$$
$$289 = c^2$$
$$c = \sqrt{289}$$
$$= 17$$

___17___ cm

(3)

3.

Not to scale

c
20cm

A

6cm a

B

b

C

ABC is a right-angled triangle.

AC = 6cm
AB = 20cm

Calculate the length of BC.
Give your answer correct to 1 decimal place.

$$a^2 + b^2 = c^2$$
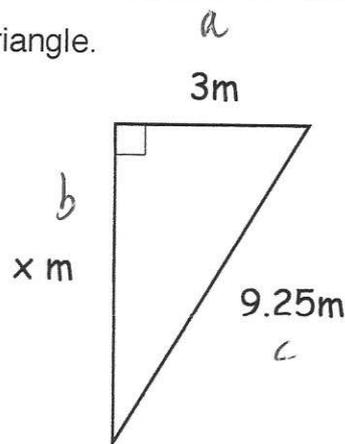
$$6^2 + b^2 = 20^2$$

$$36 + b^2 = 400$$

$$b^2 = 364$$

$$b = \sqrt{364} = 19.0787\ldots$$

........19.1........ cm

(3)

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4. Below is a right-angled triangle.

a

3m

Not drawn
accurately

b

x m

9.25m

c

Work out the value of x

$$a^2 + b^2 = c^2$$

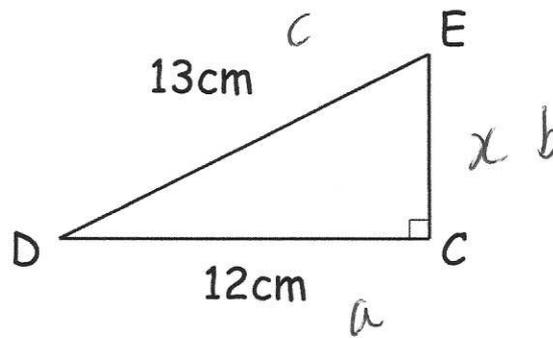$$3^2 + x^2 = 9.25^2$$

$$9 + x^2 = 85.5625$$

$$x^2 = 76.5625$$

$$x = 8.75$$

........8.75........ m

(3)

5. Shown below is a right angled triangle, CDE.

C E   Not to scale

13cm

x b

D ⌐ C

12cm

a

Work out the length of CE.

$$12^2 + x^2 = 13^2$$

$$144 + x^2 = 169$$

$\sqrt{25} = 5$ $x^2 = 25$

$$x = 5$$

........5........cm

(3)

6.

A   Not drawn accurately

x 7cm

B ⌐ C
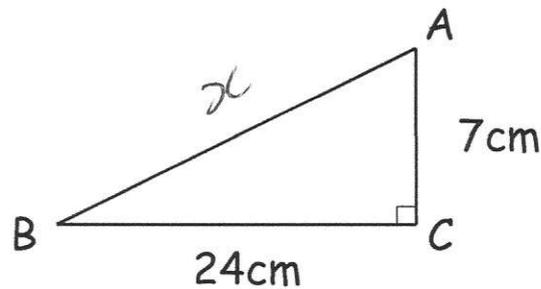
24cm

ABC is a right-angled triangle.

AC = 7cm.
BC = 24cm. $a^2 + b^2 = c^2$

Calculate the length of AB.

$$7^2 + 24^2 = x^2$$
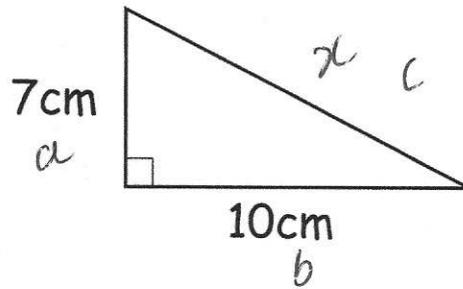
$$49 + 576 = x^2$$

$$625 = x^2$$

$$x = \sqrt{625}$$

........25........ cm

$$x = 25$$

(3)

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7. Shown is a right-angled triangle.

Not to scale

7cm a

10cm b

x c

Work out the perimeter of the triangle
Give your answer to 1 decimal place.

$$a^2 + b^2 = c^2$$
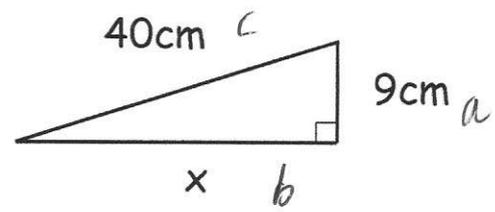$$7^2 + 10^2 = x^2$$
$$49 + 100 = x^2$$
$$x^2 = 149$$
$$x = 12.2065\ldots$$

$$7 + 10 + 12.2065\ldots$$
$$29.2065\ldots$$

........29.2........ cm

(4)

8.

40cm c

9cm a

x b

Charles says that the length of the missing side is 41cm.
Here is his method:

$$a^2 + b^2 = c^2$$
$$9^2 + 40^2 = x^2$$
$$81 + 1600 = x^2$$
$$x^2 = 1681$$
$$x = 41cm$$

$$a^2 + b^2 = c^2$$
$$9^2 + x^2 = 40^2$$
$$81 + x^2 = 1600$$
$$x^2 = 1519$$
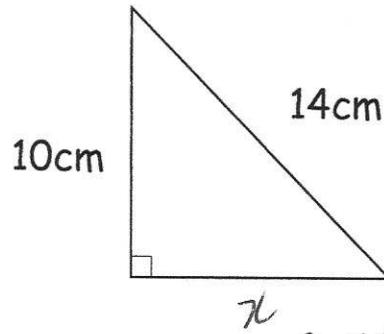$$x = 38.974\ldots$$

Explain his mistake.

.....40 cm is the hypotenuse, so it is the longest side,
so it should be $9^2 + x^2 = 40^2$, not $9^2 + 40^2 = x^2$.....

(1)

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9.

14cm

10cm

x

9.79795...

Shown is a right-angled triangle.

Calculate the area of the triangle

$$x^2 + 10^2 = 14^2 \qquad A = \frac{1}{2} \times 9.7979.. \times 10$$
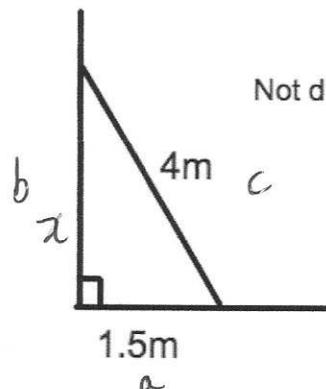$$x^2 + 100 = 196 \qquad = 48.989...$$
$$x^2 = 96$$
$$x = 9.7979...$$

48.99

.... cm²

(4)

10.

4m c

b

x

1.5m

a

Not drawn to scale

A 4 metre ladder is placed against a vertical wall.
The base of the ladder is 1.5 metres from the base of the wall.

Work out how far the ladder reaches up the wall.
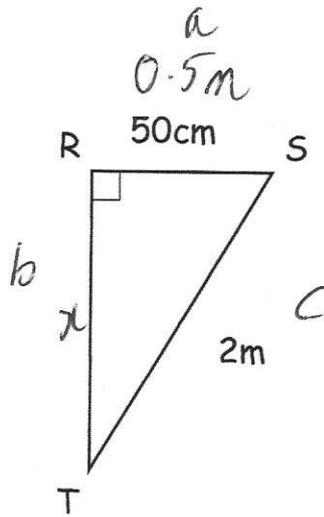
$$1.5^2 + x^2 = 4^2$$

$$2.25 + x^2 = 16$$

$$x^2 = 13.75$$

$$x = 3.708099...$$

3.708 m

(3)

11.

a
0.5m
R   50cm   S

Not drawn
accurately

b

x

C

2m

T

RST is a right-angled triangle.

RS is 50cm
ST is 2m

Calculate the length of RT
Give your answer in metres, correct to 1 decimal place.
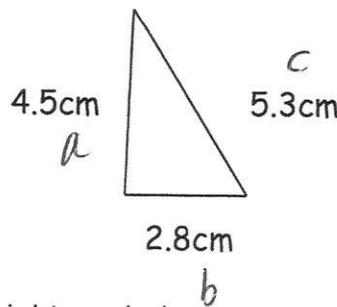
$$a^2 + b^2 = c^2$$

$$0.5^2 + x^2 = 2^2$$

$$0.25 + x^2 = 4$$

$$x^2 = 3.75$$

$$x = 1.936..$$

.........1.9......... m

(4)

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12. Belinda sketches the triangle below.

C
4.5cm   5.3cm
a

Not drawn
accurately

2.8cm

b

Show that the triangle is right-angled.

If right-angled, then $a^2 + b^2 = c^2$

$a^2 + b^2$ c^2

$4.5^2 + 2.8^2 = 28.09$ $5.3^2 = 28.09$

Therefore $a^2 + b^2 = c^2$ ✓

So the triangle is right-angled.

(2)

13. Nicole draws a triangle. a b c

The lengths of the sides are 4cm, 6cm and 7cm.

Is the triangle a right-angled triangle?
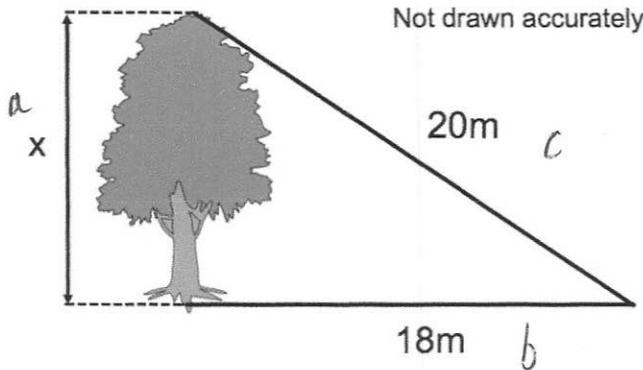Explain your answer.

If right-angled, $a^2 + b^2 = c^2$

$4^2 + 6^2 = 52$ $7^2 = 49$

$52 \neq 49$

since $a^2 + b^2 \neq c^2$, the triangle is not right-angled.

(2)

14.

Not drawn accurately

a
x

20m c

18m b

The distance from a point on the ground to the base of a tree is 18 metres.
The distance from a point on the ground to the top of a tree is 20 metres.

Calculate the height of the tree. $a^2 + b^2 = c^2$
Give the answer correct to 1 decimal place.
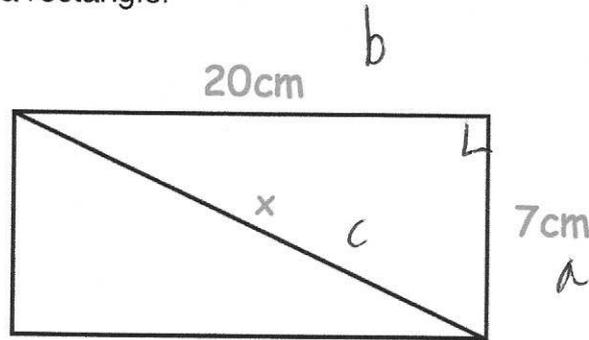
$x^2 + 18^2 = 20^2$

$x^2 + 324 = 400$

$x^2 = 76$

$x = \sqrt{76}$

$= 8.71779..$

.......8.7....... m

(3)

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15. Shown below is a rectangle.

20cm b

x

c

7cm a

Find the length of the diagonal, x.

$$a^2 + b^2 = c^2$$
$$7^2 + 20^2 = x^2$$
$$49 + 400 = x^2$$
$$x^2 = 449$$
$$x = 21.1896201$$

21.19 cm

(3)

16. Below is rectangle, ABCD

A b x B

a
5cm

c

13cm

D C

AD = 5cm
BD = 13cm

Calculate the area of rectangle ABCD.
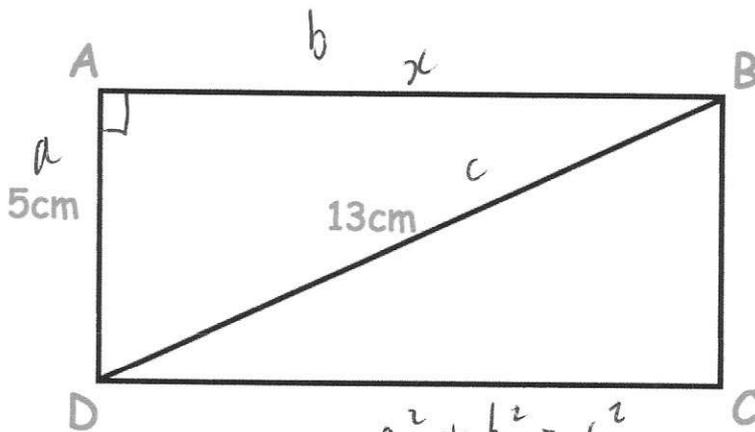
$$a^2 + b^2 = c^2$$
$$5^2 + x^2 = 13^2$$
$$25 + x^2 = 169$$
$$x^2 = 144$$
$$x = 12$$

$$5 \times 12 = 60$$

60 cm²

(3)

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17. ABC is an isosceles triangle.
AB = BC = 8cm
AC = 5cm

B

Not drawn
accurately

8cm

h

b

c

A

5cm 2·5

2·5

C

$a^2 + b^2 = c^2$

$2.5^2 + h^2 = 8^2$

$6.25 + h^2 = 64$
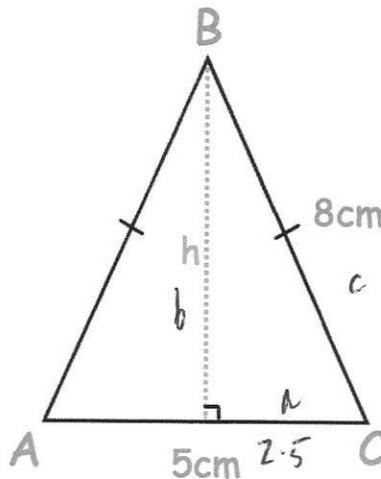
Calculate the height of the triangle, h.
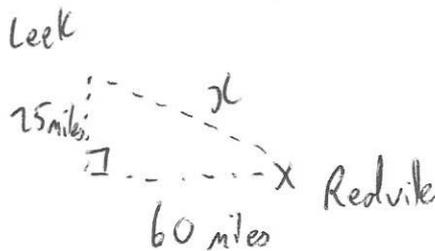
$h^2 = 57.75$

$h = 7.59934\ldots$

........7·6........cm

(3)

18. A helicopter is flying from Redville to Leek.

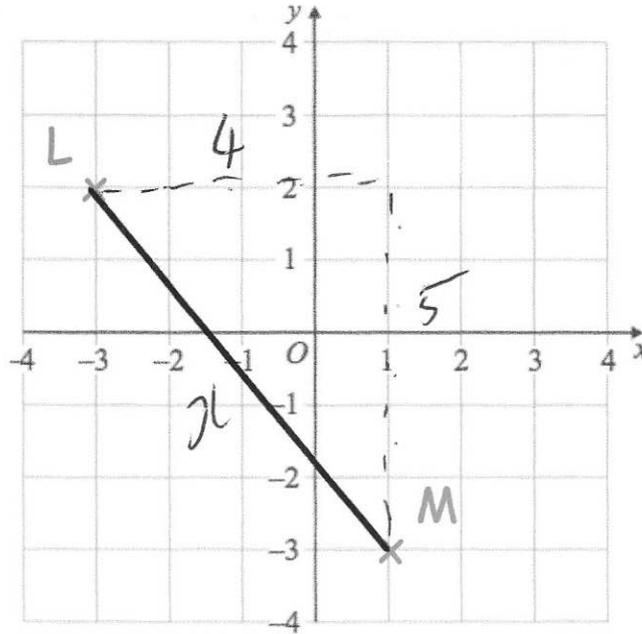The helicopter departs Redville, flies 60 miles **west**, then 25 miles **north** and arrives in Leek.

Work out the direct distance of Leek from Redville.

Leek

25miles

x

60 miles

x Redvile

$25^2 + 60^2 = x^2$

$625 + 3600 = x^2$

$4225 = x^2$

$x = 65$

65

........miles

(3)

19. A line joining the points L (–3, 2) and M(1, –3)

Work out the length of line LM.
Give your answer to 3 decimal places.

$$4^2 + 5^2 = x^2$$
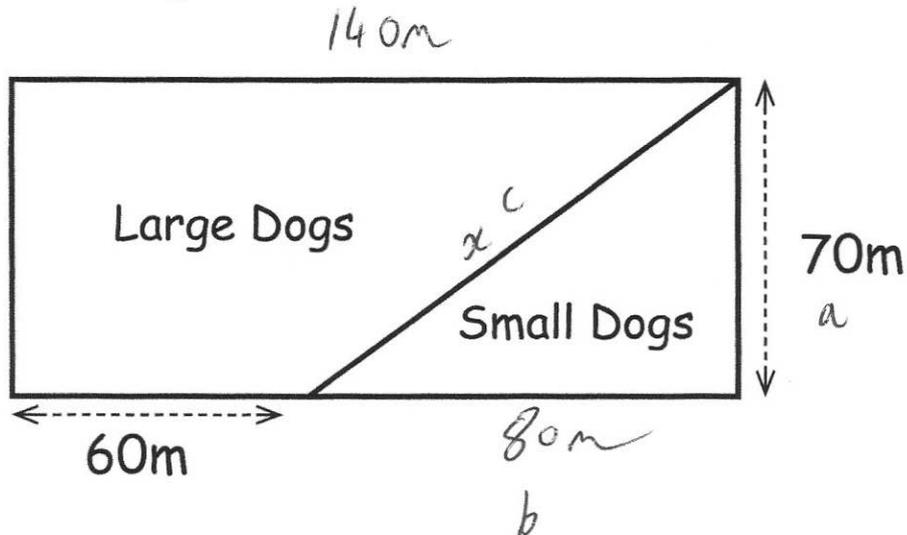
$$16 + 25 = x^2$$

$$x^2 = 41$$

$$x = \sqrt{41}$$

$$x = 6.40312..$$

6.403

....

(3)

20. A council are designing a dog park that will be in a rectangular field. The length of the field is twice the width of the field.

The field will be divided by a wall into two sections, one for large dogs and the other for small dogs.

140m

Large Dogs

x c

Small Dogs

70m

a

60m

80m

b

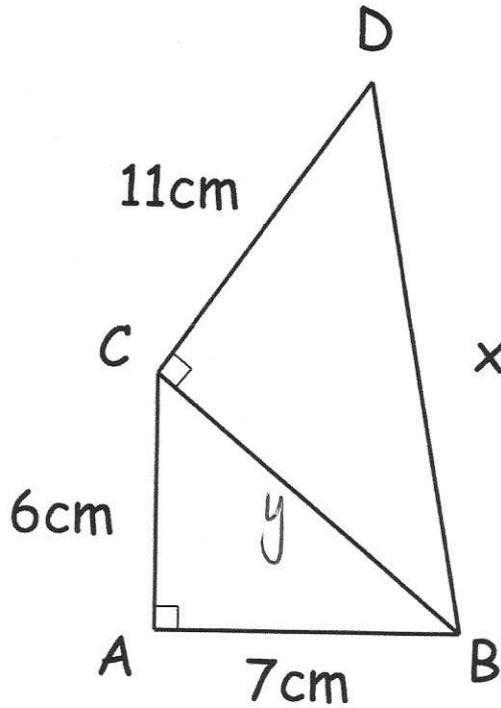Work out the length of the wall dividing the two sections.

$$70^2 + 80^2 = x^2$$

$$11300 = x^2$$

$$x = \sqrt{11300}$$

$$x = 106.30\ldots \text{m}$$

106.3 m

(4)

21. Below are two triangles, ABC and BCD.

Find the length of BD.

$$6^2 + 7^2 = y^2$$

$$36 + 49 = y^2$$

$$85 = y^2$$

$$y = 9.2195\ldots \ (\text{or } \sqrt{85})$$

I will use this.

↓

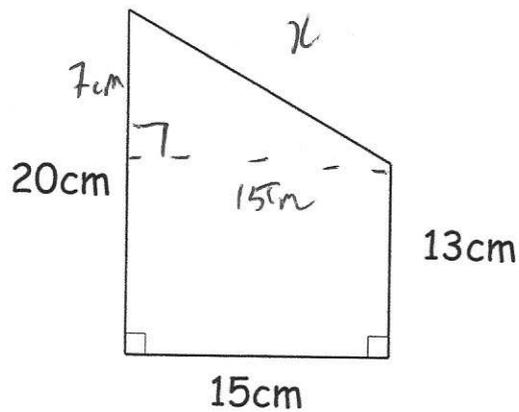$$(\sqrt{85})^2 + 11^2 = x^2$$

$$85 + 121 = x^2$$

$$206 = x^2$$

$$x = \sqrt{206}$$

$$= 14.35\ldots$$

14.35

.............................cm

(4)

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22. A frame is made from wire.
The frame is a trapezium.

Calculate the total length of wire needed to make the frame.
Give your answer to 2 decimal places.

$$7^2 + 15^2 = x^2$$

$$x^2 = 274$$

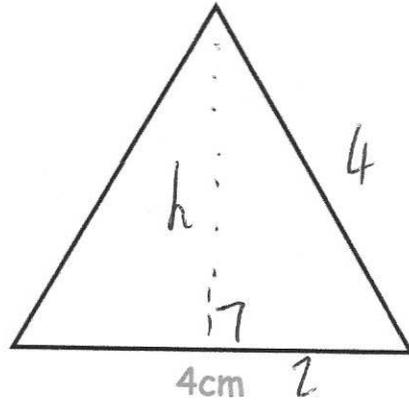$$x = 16.5529\ldots$$

$$20 + 15 + 13 + 16.5529\ldots$$

$$= 64.5529\ldots$$

64.55 ....cm

(4)

23. Shown below is an equilateral triangle of side length 4cm

Not drawn accurately

4cm

Calculate the area of the triangle

$$h^2 + 2^2 = 4^2$$

$$h^2 + 4 = 16$$
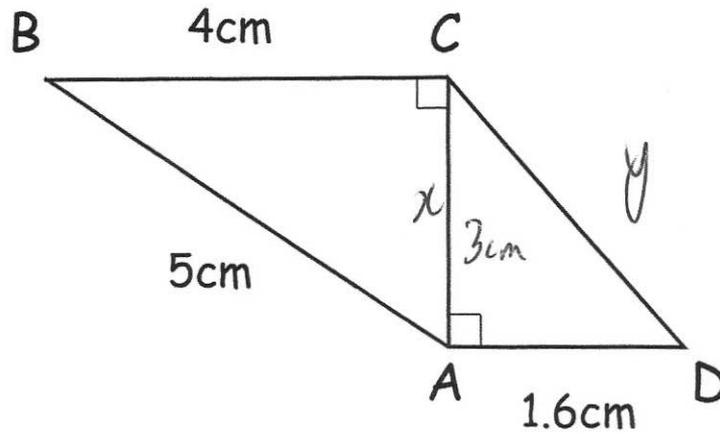
$$h^2 = 12$$

$$h = \sqrt{12} \quad (or \ 3.4641...)$$

$$A = \frac{1}{2} bh$$

$$= \frac{1}{2} \times 4 \times \sqrt{12}$$

$$= 6.928...$$

6.928 ....cm²

(5)

24. Rebecca makes a metal frame for a brooch by joining 5 pieces of wire.

B 4cm C

Not drawn accurately

5cm

x 3cm

y

A 1.6cm D

The mass of the wire is 0.489g per centimetre.

Calculate the mass of the metal frame.

$$x^2 + 4^2 = 5^2$$
$$x^2 + 16 = 25$$
$$x^2 = 9$$
$$x = 3$$

$$3^2 + 1.6^2 = y^2$$
$$y^2 = 11.56$$
$$y = 3.4cm$$

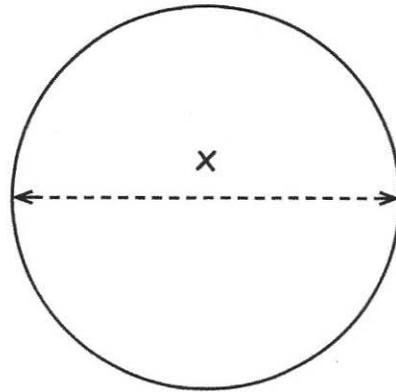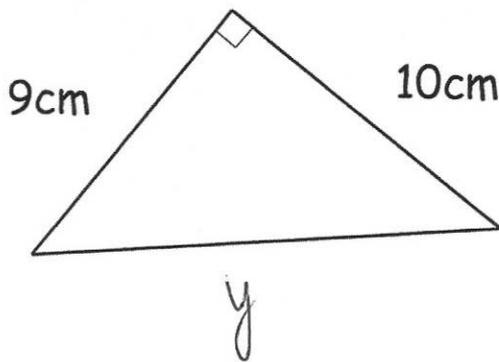........8.313........g

(5)

$$4 + 5 + 3 + 1.6 + 3.4 = 17$$

$$17 \times 0.489 = 8.313g$$

25. Shown below is a right-angled triangle and a circle.

9cm   10cm

y

x

The perimeter of the triangle is equal to the circumference of the circle.

Find the diameter of the circle, x.

$$9^2 + 10^2 = y^2$$

$$y^2 = 181$$

$$y = 13.4536... \quad (\text{or } \sqrt{181})$$

$$9 + 10 + \sqrt{181} = 19 + \sqrt{181} \quad (\text{or } 32.4536...)$$

$$C = \pi \times d$$

$$32.4536 2405 = \pi \times x$$

$$x = 32.4536 2405 \div \pi$$

$$= 10.33...$$

10.33

................................cm

to   **(4)**
2dp.

26. Shown below is a right-angled triangle.

c

10 cm

b

$\sqrt{3}$ **cm**

x a
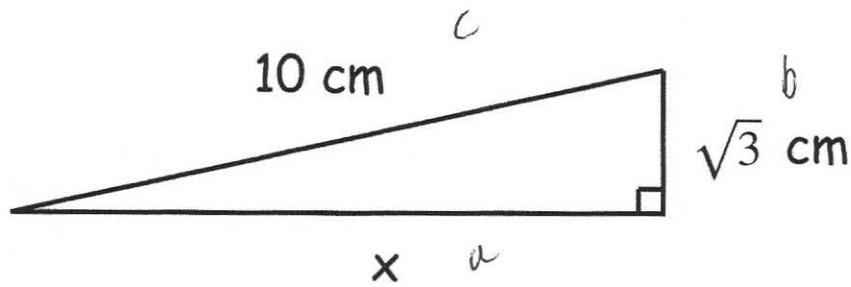
Work out the length of x
Leave your answer as a surd.

$a^2 + b^2 = c^2$

$$x^2 + \left(\sqrt{3}\right)^2 = 10^2$$

$$x^2 + 3 = 100$$

$$x^2 = 97$$

$$x = \sqrt{97}$$

$\sqrt{97}$

...........................cm

(3)