A Short Hand Geometric Reasons

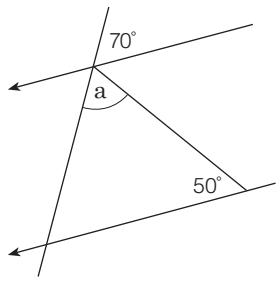
1 Write in full the meaning of these short hand geometric reasons.

Short Hand Reason	Full Meaning
a) base ∠s isos Δ are =	.....
b) corr ∠s // lines are =	.....
c) sum ∠s at pt = 360˚	.....
d) vert opp ∠s are =	.....
e) co-in ∠s // lines add to180˚	.....
f) sum ∠s in Δ = 180˚	.....
g) adj ∠s on str line add to 180˚	.....
h) alt ∠s // lines are =	.....

B Two Reasons

1 If there is no rule linking the wanted angle directly to one of the given angles, then the calculation is done in two (or more) steps, This means you also have to give two (or more) geometric reasons in your justification.
Calculate the size of the labelled angles. Give geometric a reason (in short hand) **for each step** in your solution.

a)



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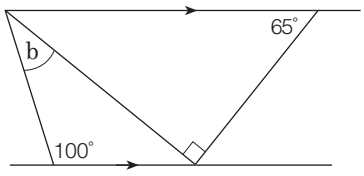
b)



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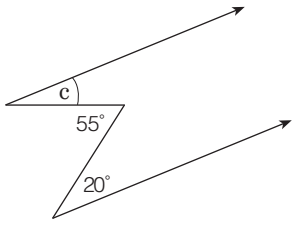
c)



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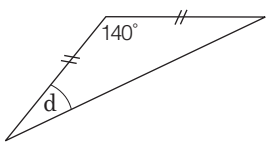
d)



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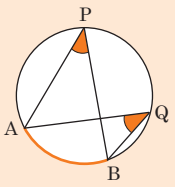
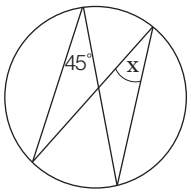
A Angles at the Circumference

Rule :
Two angles, both on the circumference and standing on the same arc, are equal.

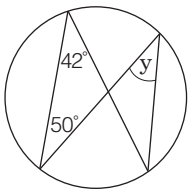
Short : ∠s same arc =



1 Calculate angles x and y.



x = ...



y = ...

2 Calculate angles a to f. Give geometric reasons.

a = ... reason :

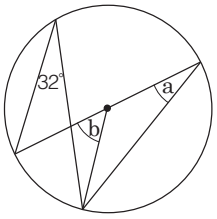
.....

.....

b = ... reason :

.....

.....



c = ... reason :

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d = ... reason :

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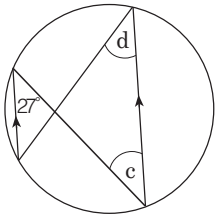


e = ... reason :

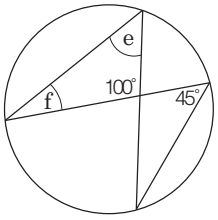
.....

.....

f = ... reason :

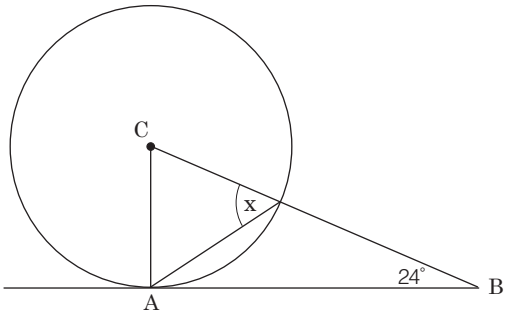
.....

.....



B Small Steps

1 Complete the 3 steps taken to calculate the size of angle x.



a) ΔABC is right-angled. Reason : .....

.....

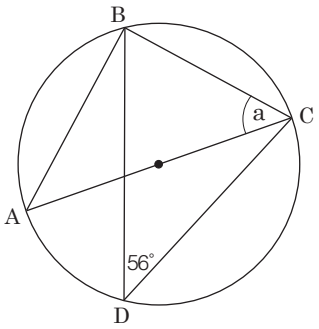
b) ∠ACB = 66°. Reason : .....

.....

c) Angle x = ... Reason : .....

.....

2



a) ΔABC is right-angled. Reason : .....

.....

b) ∠CAB = ... Reason : .....

.....

c) Angle a = ... Reason : .....

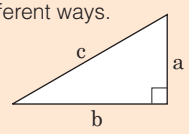
.....

31 The Rule of Pythagoras 2

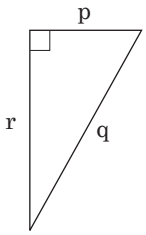
A Not the Hypotenuse

Pythagoras' Rule can be written in three different ways.

1. Starting with c : $c^2 = a^2 + b^2$
2. Starting with a : $a^2 + b^2 = c^2$
3. Starting with b : $b^2 + a^2 = c^2$



1 Write down Pythagoras' rule for this triangle in three different ways.



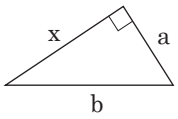
starting with p : .....

starting with q : .....

starting with r : .....

2 Write down Pythagoras's rule just once for each triangle, the rule must start with x^2.

a)



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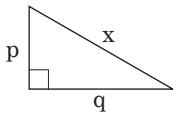
b)



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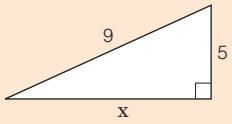
If it is not the hypotenuse but one of the other sides that must be calculated, a more difficult equation needs to be solved.
Always start the rule with the side which must be calculated.

Example : Calculate side x.



Working : Rule : $x^2 + 5^2 = 9^2$

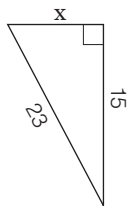
$x^2 = 9^2 - 5^2$

$x = \sqrt{9^2 - 5^2}$

$x = 7.5$ (2 sf)

3 Complete these calculations of side x.

a)



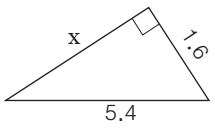
$x^2 + \ldots\ldots = \ldots\ldots$

$x^2 = \ldots\ldots$

$x = \sqrt{\ldots\ldots}$

$x = \ldots\ldots$ (2 sf)

b)



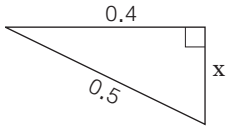
$x^2 + \ldots\ldots = \ldots\ldots$

$x^2 = \ldots\ldots$

$x = \sqrt{\ldots\ldots}$

$x = \ldots\ldots$ (3 sf)

c)



$x^2 + \ldots\ldots = \ldots\ldots$

$x^2 = \ldots\ldots$

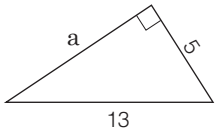
$x = \sqrt{\ldots\ldots}$

$x = \ldots\ldots$

B Lots of Practice

1 Calculate the length of the labelled sides.

a)



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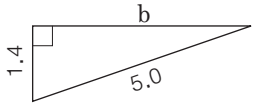

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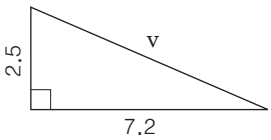
2 In this question it may be the hypotenuse or one of the other sides for you to calculate. Always write Pythagoras' rule down, starting with the side to be calculated. Then solve the equation and round sensibly.

a)



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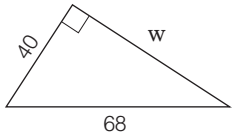
b)



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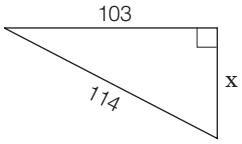
c)



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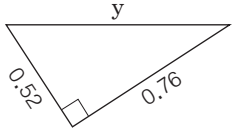
d)



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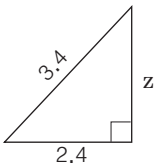
e)



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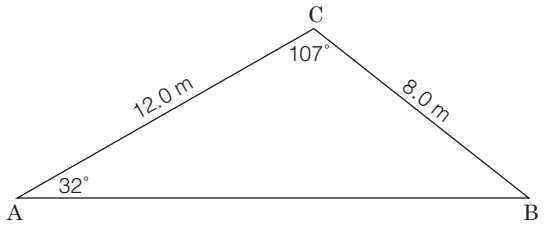
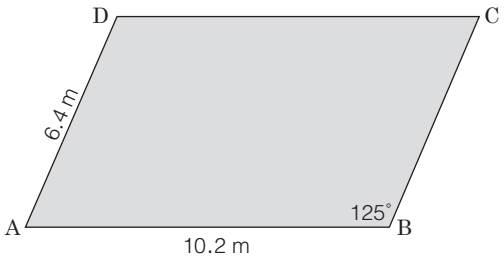
43 Applications of Trigonometry 4

A Shapes with Straight Lines

1 Triangle ABC is not a right-angled triangle. Show how the length of $\overline{AB}$ can be calculated by cutting the triangle in two. Show your working.

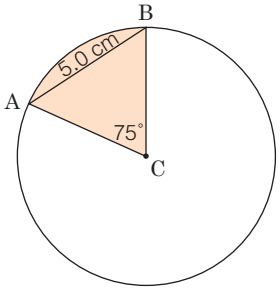


2 For a parallellogram *Area* = *base* x *height*.
Show how you work out the area of this parallelogram. Justify each step.

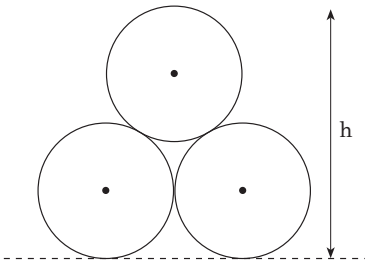


B Working with Circles

1 A sector has an angle of 75° and a chord of 5.0 cm. Calculate the radius. Show your working.



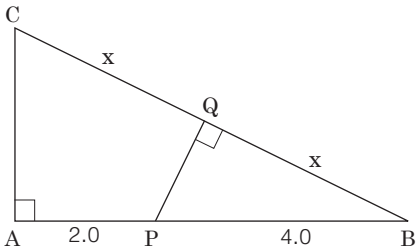
2 Three rolls of blank newspaper are stacked as shown. Each roll has a radius of 50 cm. Calculate the total height of the stack. Show your reasoning clearly.



A A Steel Frame

1 A triangular steel frame ABC is reinforced with beam $\overline{PQ}$, where Q is halfway side $\overline{BC}$ and $PQ \perp BC$.
Given that $\overline{AP}$ = 2.0 m and $\overline{PB}$ = 4.0 m, calculate . . .

a) the distance $\overline{BQ}$ (x) b) angle ABC.



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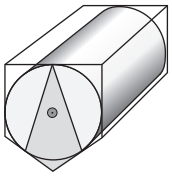
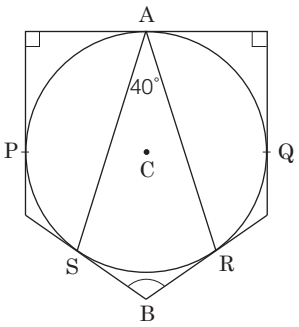
B A Battery Compartment

1 

The diagram shows a battery fitting snugly in a compartment.
The battery touches the sides at P, Q, R and S.

a) ∠SAR = 40°. Calculate ∠SBR.
Give reasons for your answer.



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b) Suppose ∠SAR = a°. Write an expression for ∠SBR in terms of a.

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c) If ∠SAR = a° and the radius of the battery is r mm, write an expression for the depth of the compartment ($\overline{AB}$).

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