Your maths exercise book is (approx) 22.8cm long and 17.3cm wide.
Without measuring, find the length of the diagonal across the book.

$a^2 + b^2 = h^2$

$22.8^2 + 17.3^2 = h^2$

$819.13 = h^2$

$h = 28.6\text{cm}$

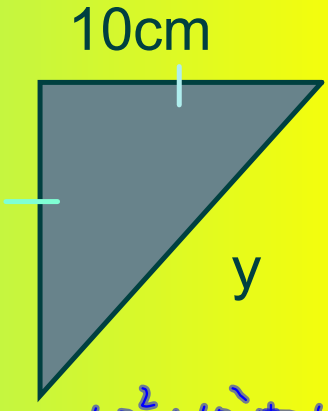
Pythagoras' Theorem

Find the unknown side.

$4^2+z^2=5^2$

$z^2=9$

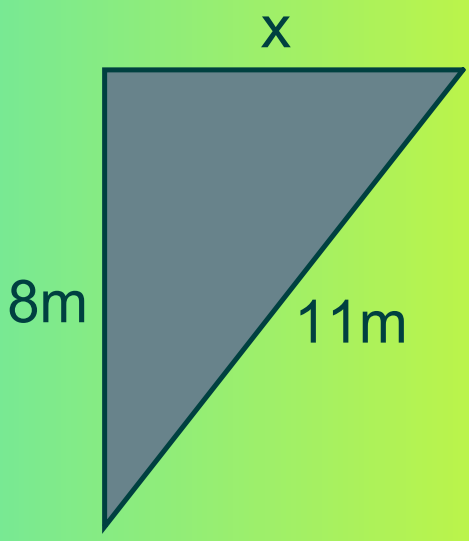
$z=3$



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

$y^2=200$

$y=14.1$ cm



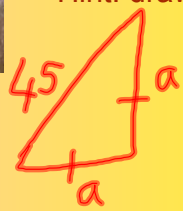
$8^2+x^2=11^2$

$x^2=57$

$x=7.5$ m

1. A square pizza box has diagonal length of 45cm. What is the diameter of the pizza (assuming it fits snugly into the box)?

Hint: draw a diagram



$2a^2 = 2025$

$a^2 = \frac{2025}{2}$

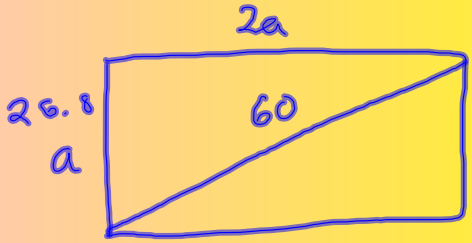
$a^2 = 1012.5$

$a = 31.8\text{ cm}$

2. Page 96 E3

3. A wide screen TV has a length which is twice the width.
If the diagonal is 60cm, what are the dimensions?

Hint: draw a diagram.



$a^2 + (2a)^2 = 60^2$

$a^2 + 4a^2 = 60^2$

$5a^2 = 60^2$

$5a^2 = 3600$

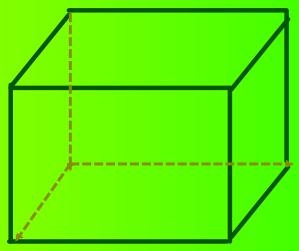
$a^2 = 720$

$a = 26.8\text{cm}$

Pythagoras' Theorem in 3D

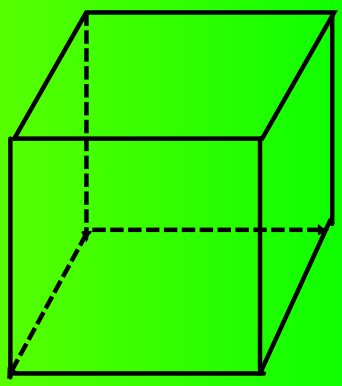
Your task:

Find the length of the longest diagonal across the cuboid ABCDEFGH.

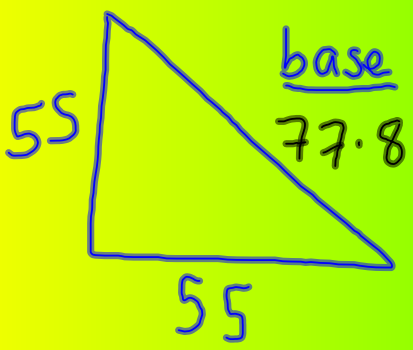


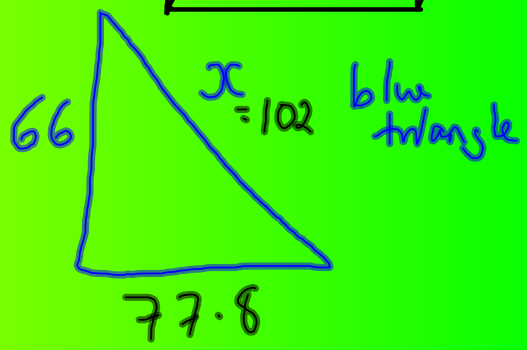
What do you need to find before you can do the task?

The desk is approx:
55x55x66cm



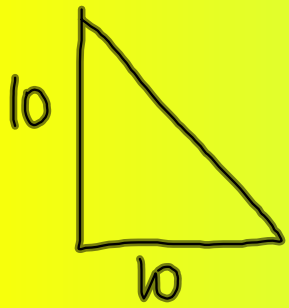
Firstly: draw diagrams of the two triangles you will need.





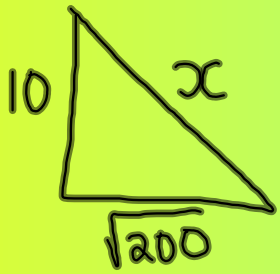
Examples:

1) Find the length of the longest diagonal of a cube side 10cm.



$10^2 + 10^2 = h^2$

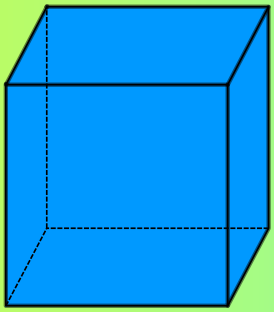
$200 = h^2$



$10^2 + 200 = x^2$ cm

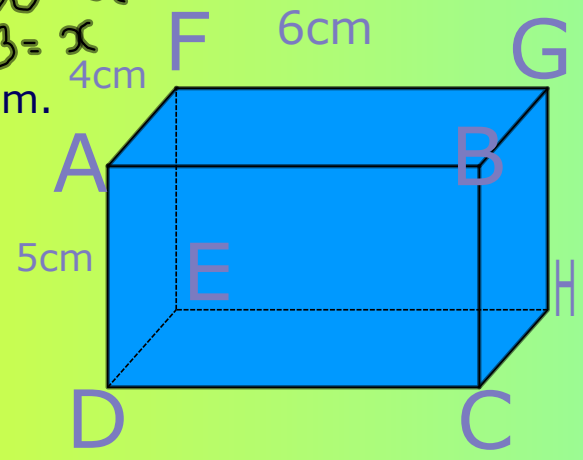
$300 = x^2$

$17.3 = x$



2) A cuboid has dimensions 4x5x6 cm.

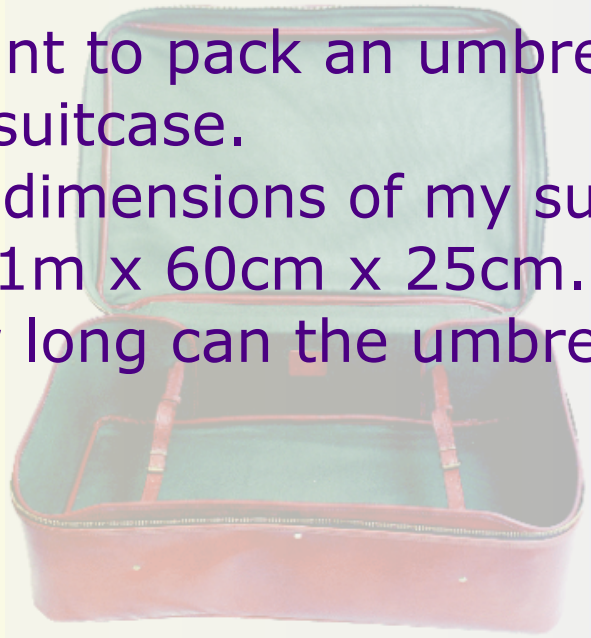
Find the length of the diagonal DH.
Hence, find the length of DG.



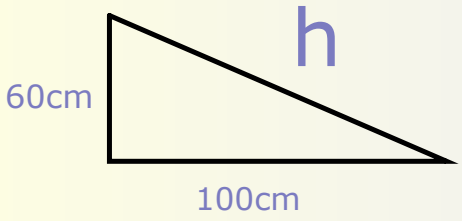
Take a box and find the length of its longest diagonal.

Don't forget to check your answer!

I want to pack an umbrella in my suitcase.
The dimensions of my suitcase are 1m x 60cm x 25cm.
How long can the umbrella be?

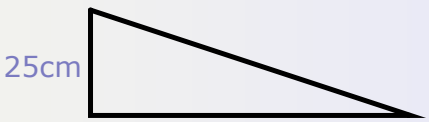


Ext:page 478 B4



$60^2+100^2=h^2$

$h^2 = 13600$



$25^2+13600=u^2$

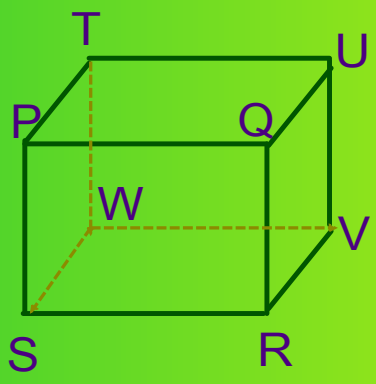
$14225=u^2$

$119.26=u$

The umbrella can be up to 119cm.

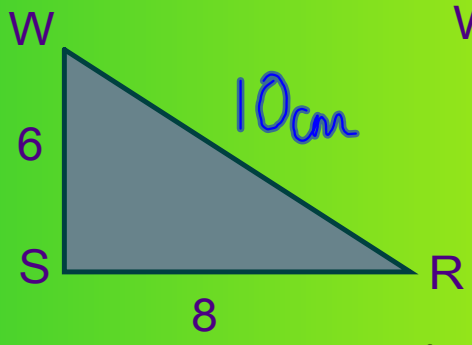
The A* question:

FIND THE LENGTH OF THE DIAGONAL TR



PQ= 8cm
PS= 5cm
PT = 6cm

We need length WR first



3, 4, 5

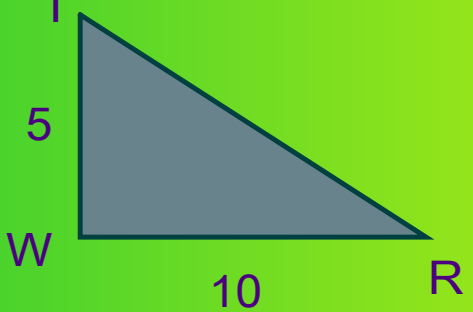
5, 12, 13

144
25
169

$5^2 + 10^2 = TR^2$

$125 = TR^2$

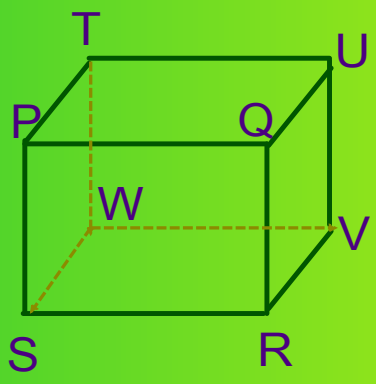
$11.2\text{cm} = TR$



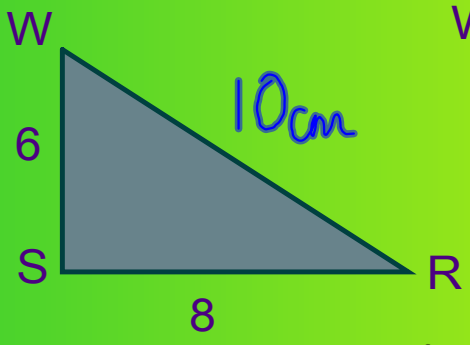
$TR^2 = TW^2 + WR^2$

The A* question:

FIND THE LENGTH OF THE DIAGONAL TR



PQ= 8cm
PS= 5cm
PT = 6cm



We need length WR first

$5^2 + 10^2 = TR^2$

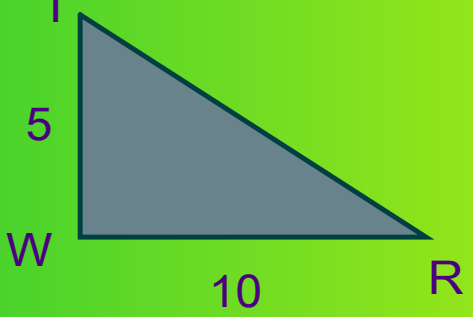
$125 = TR^2$

$11.2\text{cm} = TR$

3, 4, 5

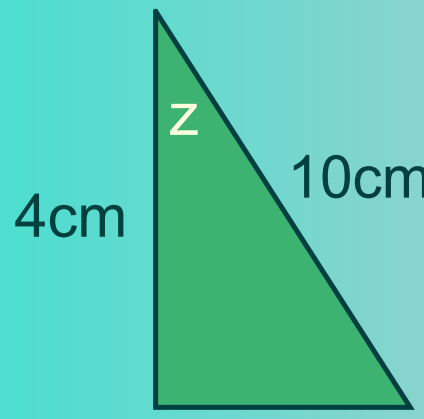
5, 12, 13

144
25
169



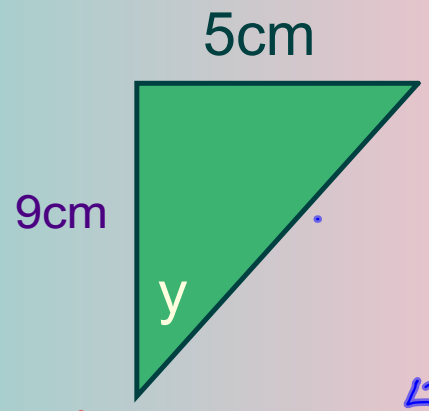
$TR^2 = TW^2 + WR^2$

Trigonometry (2)



$\cos z = \frac{4}{10}$

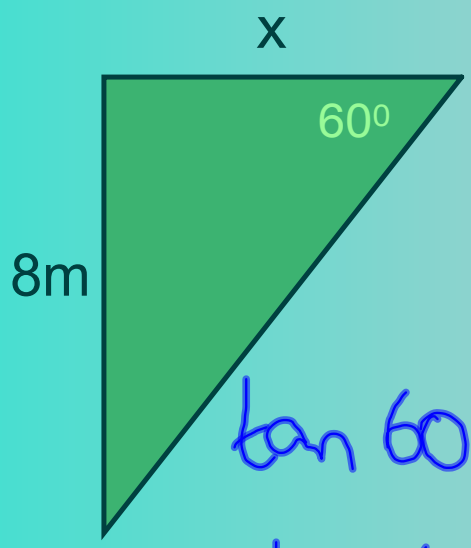
shift cos (0·4) = 66°



$\tan y = \frac{5}{9}$

shift tan $\left(\frac{5}{9}\right)$

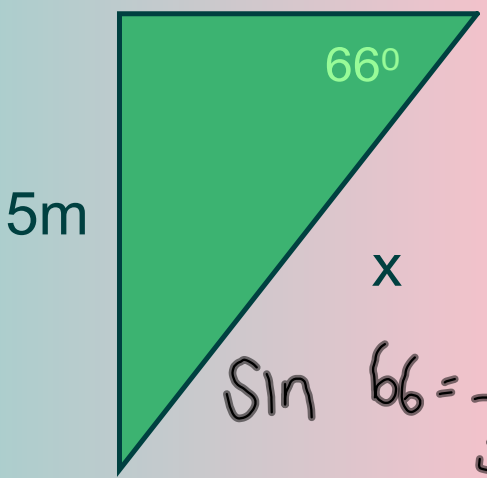
= 29°



$\tan 60 = \frac{8}{x}$

$x \tan 60 = 8$

$x = \frac{8}{\tan 60} = 4.6$



$\sin 66 = \frac{5}{x}$

$x = \frac{5}{\sin 66}$

= 5.5m

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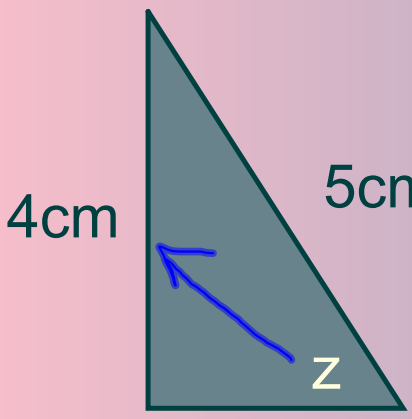
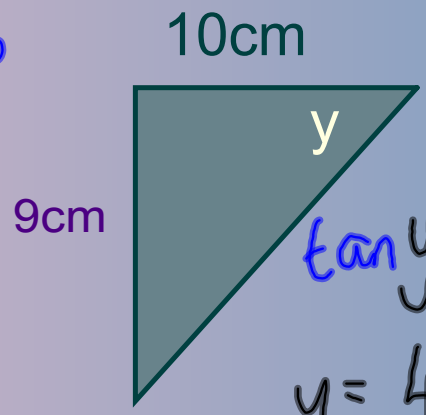
Trigonometry



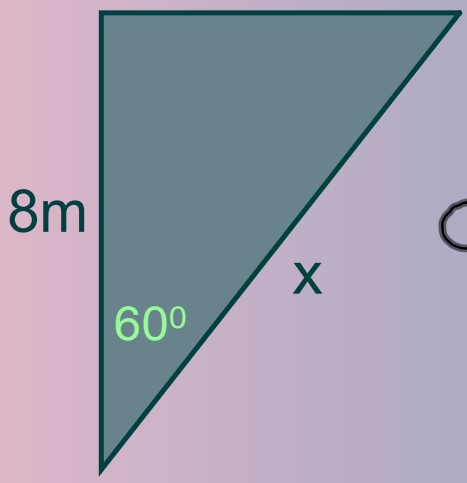
$\sin z = \frac{4}{5}$

$z = 53.1^\circ$



$\tan y = \frac{9}{10}$

$y = 42.0^\circ$



$\cos 60 = \frac{8}{x}$

$0.5 = \frac{8}{x}$

$0.5x = 8$

$x = \frac{8}{0.5} = 16$

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Trigonometry in 3D

The desk is approx:
55x55x66cm.
Find the angle of elevation of the longest diagonal.

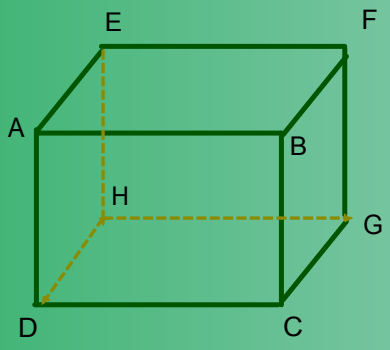
$55^2+55^2=h^2$

$h=77.8\text{cm}$

$\tan x=\frac{66}{77.8}$

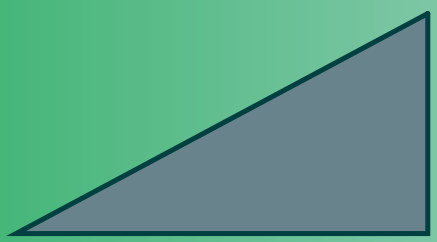
shift tan(66÷77.8) = 40.3°

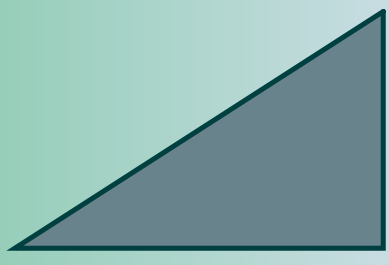
$x=40.3°$



Find the angle of elevation of the longest diagonal.

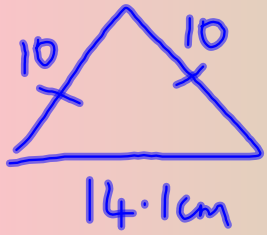
Consider DF.

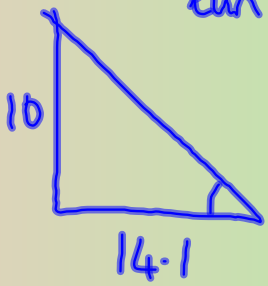




Examples:

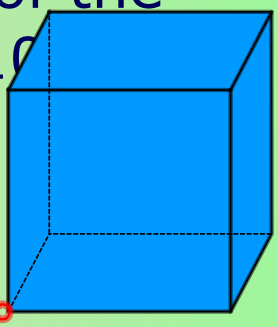
1) a)Find the angle of elevation of the longest diagonal of a cube side 10
b) Find its length.





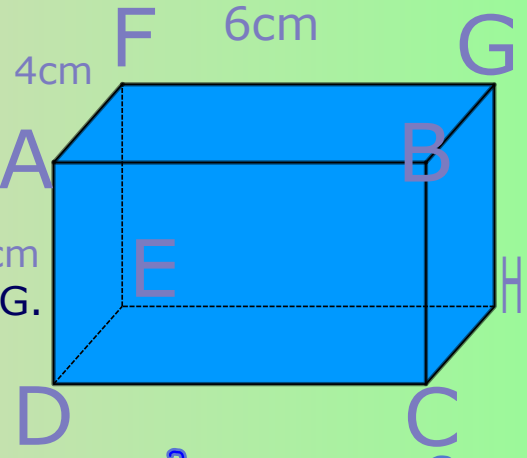
$\tan x = \frac{10}{14.1}$

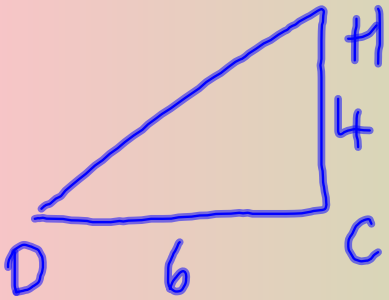
$x = 35.3°$



2) A cuboid has dimensions 4x5x6 cm.

Find the length of the diagonal DH.
Hence, find the angle of elevation of DG.



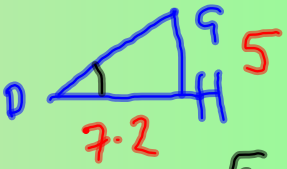


$6^2 + 4^2 = DH^2$

$36 + 16 = DH^2$

$52 = DH^2$

$DH = 7.2\text{cm}$



$\tan D = \frac{5}{7.2}$

$D = 34.8°$

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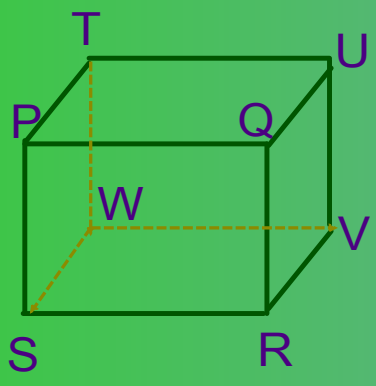
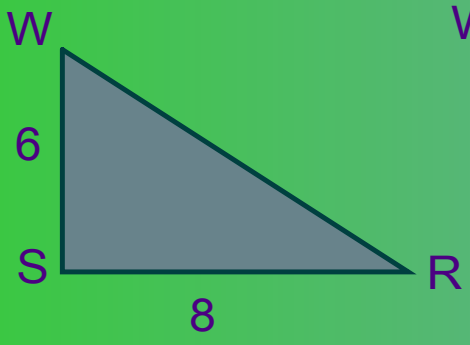
The A* question:

FIND THE ANGLE OF ELEVATION OF THE DIAGONAL TR



PQ= 8cm
PS= 5cm
PT = 6cm

Which angle do I need?



We need length WR first