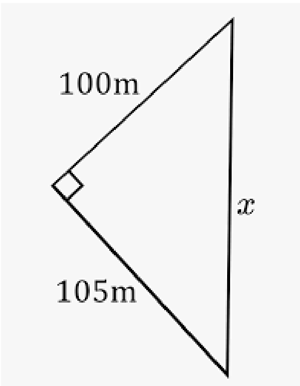
Pythagoras, Distance and Using your Calculator for Trig

A quick review of Pythagorean theorem : $a^2 + b^2 = c^2$ $\quad$ $(leg)^2 + (leg)^2 = (hypotenuse)^2$

Find x in the following accurate to at least 1 decimal place

1a)

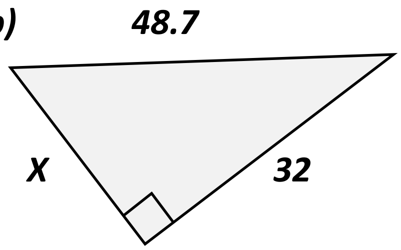


Here we know the legs

$100^2 + 105^2 = x^2$

$21025 = x^2$ so $x = 145$

b)

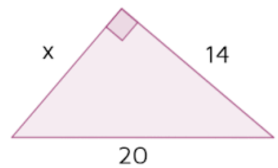


we know hypotenuse

$48.7^2 - 32^2 = x^2$

$1347.69 = x^2$ $\quad$ $x = 36.7$

c)



we know hypotenuse

$20^2 - 14^2 = x^2$

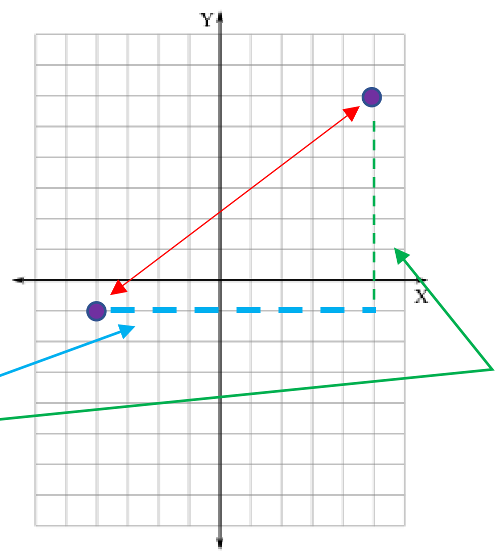
$204 = x^2$ $\quad$ $x = 14.28$

Find the distance between 2 points

Given the points (-4, -1) and (5, 6)
Find the distance between

We can make a triangle
First look x distance
9 spaces

y-distance
7 spaces



So distance $9^2 + 7^2 = d^2$ $\quad$ $d = \sqrt{130}$ *or* 11.4

But I don't want to have to draw a diagram each time
Where did the 9 come from …difference in x's: $\quad$ ***(5 - -4)***
Where did the 7 come from …difference in y's: $\quad$ ***(6 - -1)***
which then went into Pythagoras

Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Could we find the point in the exact middle of the distance line?
Yes – its an average of the points that created the distance

Midpoint formula: $\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

2) Find the exact distance and midpoint between

a) (12, 10) and (-3, -2)

$d = \sqrt{(-3-12)^2 + (-2-10)^2}$ $\quad d = \sqrt{(-15)^2 + (-12)^2}$ $\quad d = \sqrt{369}$ *or* $3\sqrt{41}$

Mid-pt: $\left(\frac{-3+12}{2}, \frac{-2+10}{2}\right) \rightarrow \left(\frac{9}{2}, 4\right)$

b) (-4, -3) and (7, -11)

$d = \sqrt{(7--4)^2 + (-11--3)^2}$ $\quad d = \sqrt{(11)^2 + (-8)^2}$ $\quad d = \sqrt{185}$

Mid-pt: $\left(\frac{7+-4}{2}, \frac{-11+-3}{2}\right) \rightarrow \left(\frac{3}{2}, -4\right)$

As we are about to start trigonometry … we must be comfortable using our calculators

Step 1: *make sure calculator is in degree mode*
You might have a DRG button, or a mode setting
If in degrees a D or DEG should be visible on your screen

Step 2: *Is it a forwards or backwards calculator*
Type in: $\boxed{\text{sin}}$ *60 =* *if you get 0.8660 you type things as you see them*
Or *60* $\boxed{\text{sin}}$ *if this produces 0.8660 , you have a backwards calculator*

Try to produce the following:

Sin 15° = *cos 56° =* *tan 32° =*

0.2588 *0.5592* *0.6249*

The opposite:

When you see a statement like: *sin A = 0.23*

You need to used your $\boxed{2^{nd}}$ *or* $\boxed{\text{inv}}$ *button* $\boxed{2^{nd}}$ *sin* $\boxed{0.23}$ *= 13.297*

Or 0.23 $\boxed{2^{nd}}\boxed{\text{sin}}$

Try solving:

Sin A = 0.66 *cos B = 0.445* *tan C = 1.58*

A = 41.3 *B = 63.6* *C = 57.67*

Assignment = worksheet

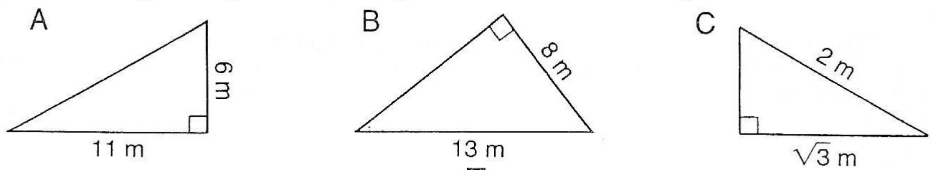
Pythagoras, Distance and Using your calc too 😊

How do you write a song that will knock over a cow? ***(cross out answers – remaining = joke!)***

BY $\sqrt{7200}$ ft ≑84.9 ft	IN $\sqrt{123}$ m ≑11.1 m	SO $\sqrt{105}$ m ≑10.2 m	TH $\sqrt{675}$ cm ≑26.0 cm	BE $\sqrt{6400}$ ft =80 ft	AT $\sqrt{975}$ m ≑31.2 m	ER $\sqrt{149}$ cm ≑12.2 cm
EF $\sqrt{850}$ m ≑29.2 m	OR $\sqrt{336}$ ft ≑18.3 ft	NG $\sqrt{157}$ m ≑12.5 m	FL $\sqrt{425}$ cm ≑20.6 cm	IT $\sqrt{1}$ m =1 m	BE $\sqrt{400}$ in. =20 in.	AT $\sqrt{380}$ in. ≑19.5 in.

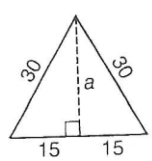
②A rectangle is 7cm wide and 10 cm long. Find the length of the diagonal of the rectangle

① For each right triangle, find the length of the side that is not given:

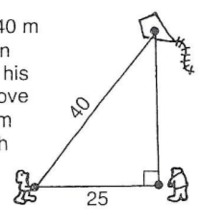


④ A 20 foot ladder is leaned against a wall. If the base of the ladder is 8 feet from the wall, how far up the wall will the ladder reach?

③ Each side of an equilateral triangle measures 30 cm. Find the length of an altitude, a, of the triangle.



⑦ Jack has let out 40 m of kite string when he observes that his kite is directly above Jill. If Jack is 25 m from Jill, how high is the kite?



⑤ The bases of a softball diamond are 60 feet apart. How far is home base from second base?

⑥ A television set may be described in terms of the diagonal measure of its screen. If the TV screen is 16 inches by 12 inches, what is the length of the diagonal?

Use you calculate to evaluate the following accurate to 4 decimal places

a) ***sin 20°*** ***b)*** ***cos 40°*** ***c)*** ***tan 52°*** ***d)*** ***tan 12°*** ***e)*** ***sin 82°***

f) ***tan 48°*** ***g)*** ***sin35°*** ***h)*** ***cos 54°*** ***i)*** ***cos 4°*** ***j)*** ***sin 8°***

Use you calculate to solve the following accurate to 1 decimal place

a)	***Sin A = ½***	***b)***	***cos A = ¾***	***c)***	***tan A = ⅔***	***d)***	***Cos A = ⅞***	***e)***	***cos A = ⅘***
f)	***sin B=⅘***	***g)***	***cos B = ⅕***	***h)***	***tan B = ⅚***	***i)***	***sin B = ⅙***	***j)***	***cos B = ⅝***

Find the <u>exact</u> distance between the given points

a) (3, -5) and (-6, 7)

b) (-1, 2) and (-6, -3)

c) (3, 0) and (4, -1)

d) (8.1, 3.7) and (3.2, -5.4)

e) (13, 6) and (-3, 7)

f) (2, -4) and (-3, 5)

Find the midpoint between the given points

a) (3, -5) and (-6, 7)

b) (-1, 2) and (-6, -3)

c) (3, 0) and (4, -1)

d) (8.1, 3.7) and (3.2, -5.4)

e) (13, 6) and (-3, 7)

f) (2, -4) and (-3, 5)

Determine if P(4, 2), E(-2, -2) and N(2, -8) are the vertices of an isosceles Δ.