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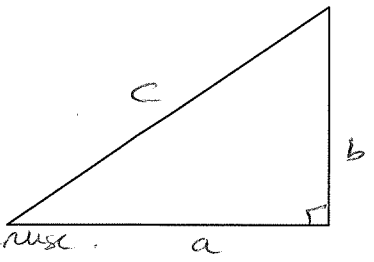
Do you Remember?

Pythagorean Theorem

A right triangle is right-angled triangle (90° angle).

The hypotenuse of a right triangle is side opposite to 90°

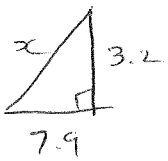


The largest side in a triangle is the hypotenuse.

The relationship between the sides of a right triangle is: $a^2+b^2=c^2$

Examples:

1. A right-angled triangle has legs that measure 7.9 cm and 3.2 cm. Calculate the length ofthe hypotenuse.



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

$x^2=3.2^2+7.9^2$

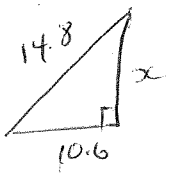
$x^2=72.65$

$x=\sqrt{72.65}$

$\doteq 8.5\text{ cm}$

2. A right-angled triangle has a leg thatmeasures 10.6 mm and a hypotenuse thatmeasures 14.8 mm. Calculate the length ofthe other leg.

$b^2=c^2-a^2$



$x^2=14.8^2-10.6^2$

$x^2=106.68$

$x=\sqrt{106.68}$

$=10.3\text{ mm}$

2. Mr. Patel presented his mathematics class with several triangles.
The side lengths were the following:
Triangle A: 15.3, 20.4, 25.5
Triangle B: 3.1, 4.1, 5.1
Triangle C: 8, 15, 17
Triangle D: 7, 24, 24
Which are right triangles?

Concept: check if $a^2+b^2=c^2$.

ΔA: $a^2+b^2\overset{?}{=}c^2$

$15.3^2+20.4^2=650.25$

$25.5^2=650.25$

∴ yes. It is a right-angled triangle.

ΔB: $3.1^2+4.1^2=26.42$

$5.1^2=26.01$

$\therefore 26.42\neq 26.01$

ΔB is not a right angle triangle.

ΔC: $8^2+15^2=289$

$17^2=289$

∴ yes, it is a right angle triangle.

ΔD: $7^2+24^2\neq 24^2$

∴ not a right angle triangle.

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Solving Proportions

A ratio is a comparison of two numbers. A proportion is just two ratios that are equal to each other. Be sure that the same units of measurement are in the numerator and the same units of measurement are in the denominator.

Example: There are 149 nurses, 69 doctors, and 230 patients in a hospital.

1. Find the ratios (reduce to lowest terms)
   - Nurses to doctors:
     149 : 69
   - Doctors to patients:
     69 : 230
     3 : 10
   - Patients to doctors:
     10 : 3

2. The hospital is required to have one doctor for every 5 patients and 2 nurses for every 5 patients. What is the minimum number of doctors and nurse that the hospital must have?

doctors: $\frac{5 \text{ pat}}{230 \text{ pat}} = \frac{1 \text{ doc}}{x \text{ ?}}$

$\frac{5}{230} = \frac{1}{x}$ (cross multiply)

$5x = 230$

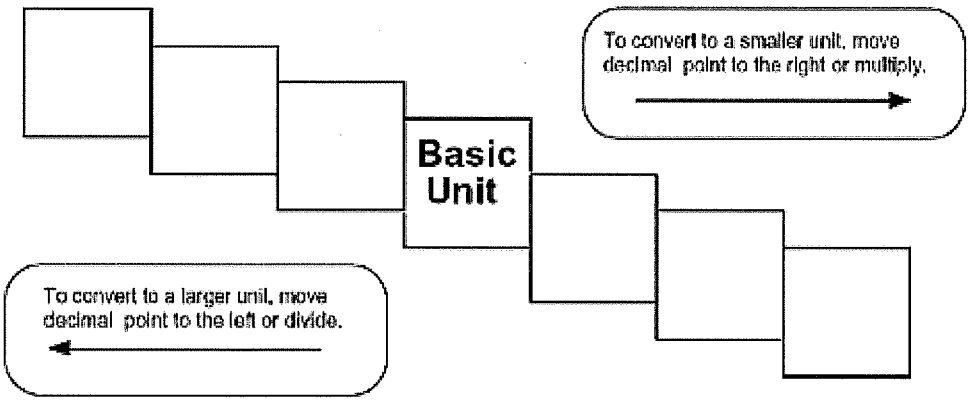
$x = 46$

$\therefore$ 46 doctors

$46 \times 2 = 92$ doctors.

Unit Conversions

The metric system is based on powers of 10.



1. Convert 3 m to cm

$1 \text{ m} = 100 \text{ cm}$

$\therefore 3 \text{ m} = 300 \text{ cm}$

2 places.

2. Convert 600 mg to g

$1 \text{ g} = 1000 \text{ mg}$

600 (3 places)

$\therefore 0.6 \text{ g} = 600 \text{ mg}$

3. Convert 42 000 km to cm

$1 \text{ km} = 1000 \text{ m}$

$1 \text{ m} = 100 \text{ cm}$

$\therefore$ 5 places

$42000 = 4200000000 \text{ cm}$

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Many people use the imperial system of measurement. The most common imperial units of length are the inch, foot, yard and mile.

Example: Match each measure with its equivalent

a) 6 mm
b) 140 yd
c) 52.819 miles
d) 29 cm^2

A 4.494 991 $in.^2$
B 85 km
C 0.236 22 in.
D 128.016 m

Imperial to Metric	Metric to Imperial
1 inch = 2.54 cm	1 cm ≐ 0.3937 inch
1 foot = 30.48 cm	1 m ≐ 39.37 inches
1 foot = 0.3048 m	1 m ≐ 3.2808 feet
1 mile ≐ 1.609 km	1 km ≐ 0.6214 mile

c) 52.819 miles = 52.819 × 1.609 km

≐ 85 km

∴ 52.819 miles = 85 km (B)

b) 140 yd = 140 × 3 feet

= 420 feet

1 m = 3.2808 feet

∴ $\frac{420}{3.2808}$ = 128.016 m (D)

a) must be (C)

d) must be A since cm^2, in^2

Seatwork: Page 2 #1-3, Page 3 #1-3

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Exit Card

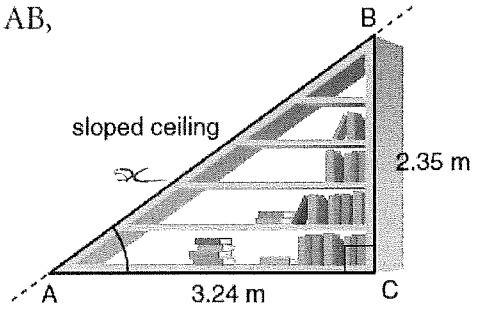
MAP4C Lesson 1.2

13. Assessment Focus A carpenter is building a bookshelf against the sloped ceiling of an attic.

a) Determine the length of the sloped ceiling, AB, used to build the bookshelf.

b) Determine the measure of $\angle A$. Is $\angle A$ an angle of inclination or an angle of depression? Why?

c) Describe another method to solve part b. Which method do you prefer? Why?



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

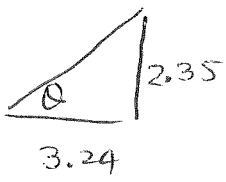
$x^2 = 3.24^2 + 2.35^2$

$x^2 = 16.02$

$x = \sqrt{16.02}$

$= 4.0$

b)



$\tan\theta = \frac{2.35}{3.24}$ → opp / adj

$\theta = \tan^{-1}\left(\frac{2.35}{3.24}\right)$

$\theta = 36^\circ$

angle of inclination

c) We can use $\sin\theta = \frac{opp}{hyp}$

$\sin\theta = \frac{2.35}{4}$

$\theta = \sin^{-1}\left(\frac{2.35}{4}\right)$

$= 36^\circ$

I prefer tan θ since hypotenuse was not given