

Year – 11 Conversion Questions #2

1. 1 litre = 0.2642 (US) gallons. What is 14 gallons in litres?
2. 1 mile = 1.61 kilometres. Give 77 miles in km.
3. 1 fathom = 1.829 metres. If a diver is 10 metres down, what is that in fathoms?
4. 1 knot = 1.852 km per hour. What is a boat speed of 60 kph in knots?
5. 1 acre = 0.4047 hectares. What is a farm of 23 hectares in acres?
6. 1 troy ounce = 31.1 grams. Convert 1.6 troy ounces of silver to grams.
7. 0.4536 kilogram is 1 pounds . How heavy in kg is a 350 pound gorilla?
8. There are 0.7457 kilowatts in 1 horsepower. What is a 350 kW engine in horsepower?
9. 1 foot is 0.3048 metres. How many millimetres is a yard? (A yard is 3 feet)
10. Typically concrete weighs 2.4 tonnes per m^3 . and steel weighs 7.7 tonnes per m^3 . How many m^3 of concrete weighs the same as 2 m^3 of steel?
11. 1 kPa (kiloPascals) = 0.1450 psi (Pound Per Square Inch). The atmospheric pressure of Mars is 600 Pascals. Give that in psi.
12. Earth has an atmosphere of 1 bar, which is 100 kPa exactly. Venus has an atmosphere of 9.2 megapascals. How many times heavier is Venus's atmosphere than earths?
13. If a car takes 12.8 litres to go 100 km, how many km per litre does it do?
14. 440 New Zealand Dollar equals 2569.02 Hong Kong Dollars on 22 February 2015. What would 55,000 HK\$ be worth in NZ\$ at that time?
15. 1 light year (the distance light travels in a year in a vacuum) = 9.46×10^{15} meters
How many kilometres does light travel in a second?

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The exact methods used can differ, so the following are only suggested calculations

1. Need more in litres $\Rightarrow 14 \text{ Gall} = 14 \div 0.2642 = \mathbf{52.99 \text{ litres}}$.
2. Need more in km $\Rightarrow 77 \text{ miles} = 77 \times 1.61 = \mathbf{123.97 \text{ km}}$.
3. Need less in fathoms $\Rightarrow 10 \text{ metres} = 10 \div 1.829 = \mathbf{5.467 \text{ fathoms}}$.
4. Need smaller number in knots $\Rightarrow 60 \text{ kph} = 60 \div 1.852 = \mathbf{32.4 \text{ knots}}$.
5. Need more acres $\Rightarrow 23 \text{ ha} = 23 \div 0.4047 = \mathbf{56.83 \text{ acres}}$.
6. Grams is bigger number $\Rightarrow 1.6 \text{ troy oz} = 1.6 \times 31.1 = \mathbf{49.76 \text{ grams}}$.
7. Need smaller number of kg $\Rightarrow 350 \times 0.4536 = \mathbf{158.76 \text{ kg}}$.
8. Need larger number of horsepower $\Rightarrow 350 \div 0.7457 = \mathbf{469.4 \text{ horsepower}}$.
9. 1 ft is 0.3048 m $\Rightarrow 1 \text{ yard} = 3 \times 0.3048 = .9144 \text{ m} = 0.9144 \times 1000 = \mathbf{914.4 \text{ mm}}$
10. More tonnes of steel than $\text{m}^3 \Rightarrow 2 \text{ m}^3 \text{ of steel} = 2 \times 7.7 = 15.4 \text{ tonnes}$.
Less m^3 of concrete than tonnes $\Rightarrow 15.4 \div 2.4 = \mathbf{6.42 \text{ m}^3 \text{ of concrete}}$
11. $600 \text{ Pa} = 600 \div 1000 = 0.6 \text{ kPa}$
Need less psi than kPa $\Rightarrow 0.6 \times 0.1450 = \mathbf{0.087 \text{ psi}}$.
12. $9.2 \text{ MPa} = 9.2 \times 1000 = 9200 \text{ kPa}$.
 $9200 \text{ kPa} = 9200 \div 100 = 92 \text{ bar}$ (as 1 bar = 100 kPa).
So Venus has an atmosphere **92** \times heavier than earth.
13. $12.8 \text{ L} = 100 \text{ km} \Rightarrow$ dividing both sides by 12.8 gives $1 \text{ L} = 7.8125 \text{ km}$.
Which means it gets **7.8 km per L**.
14. $440 \text{ NZD} = 2569.02 \text{ HKD}$, so dividing both sides by 440: $1 \text{ NZD} = 5.8387 \text{ HKD}$.
Need less NZD than HKD $\Rightarrow 55,000 \div 5.8387 = \mathbf{\$9,419.91 \text{ NZ}}$.
15. $9.46 \times 10^{15} \text{ m per year} = 9.46 \times 10^{15} \text{ m} \div 365 \div 24 \div 60 \div 60 = 3.00 \times 10^8 \text{ m s}^{-1}$.
 $3.00 \times 10^8 \text{ metres per second} = 3.00 \times 10^8 \div 1000 = 3.00 \times 10^5 \text{ km s}^{-1}$
Light travels **300,000 km** each second.