Starter - NO Calculators

1) Find 20% of 248

2) Find $3\frac{1}{5} - 1\frac{3}{4}$

) Find the highest common factor of 14 and 49.

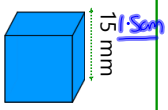
4) Find 35% of £80.

5) Calculate 256 ÷ 64

Today's Learning:

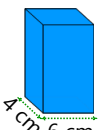
To revise volume of cubes, cuboids and prisms.

1) Find the volume of this cube in cm^3:

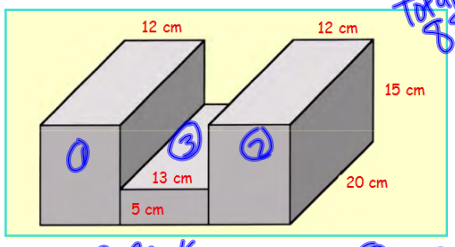


2) Find the volume of this carton in ml:

3) If the volume of this cuboid is 432 ml, find its height.



Calculate the total volume of the object:



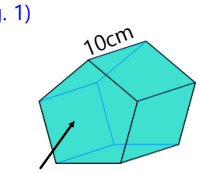
Volume of Prisms

11/1/17

A prism has the same cross-section all the way through its height.

Volume = cross section area x height

E.g. 1)

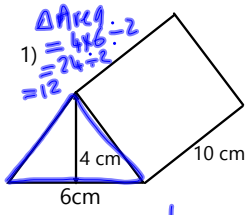


Area = 18cm²

V = Area x height
= 18 x 10
= 180 cm³

Find the volume of these objects:

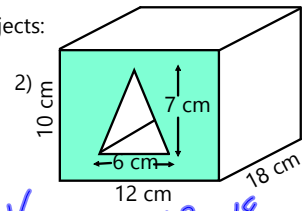
1)



ΔArea ÷2
= 4x6 ÷2
= 24 ÷2
= 12

V = Area x h
= 12 x 10
= 120cm³

2)



$V_{\Delta} = 6 \times 7 \div 2 \times 18$
$= 378\ cm^3$

$V_{cuboid} = 10 \times 12 \times 18 = 2160 cm^3$

$V_{bl} = 2160 - 378 = 1782 cm^3$

Starter

1) Solve for g: $\frac{2g}{6} + 1 = 2g + 3$

$2g + 6 = 12g + 18$
$-6 \quad -6$
$2g = 12g + 12$
$-2g \quad -2g$
$0 = 10g + 12$

$-12 = 10g$
$\div 10 \quad \div 10$
$\frac{-12}{10} = g$
$g = -1.2$

2) Without a calculator, find 0.34 x 1.3

34 x 13 = 442
3.4 x 13 = 44.2
0.34 x 13 = 4.42
0.34 x 1.3 = 0.442

34
x 13
102
340
0.442

3) Calculate 2 + 3(1 + 3²) - 3 x 6

$= 2 + 3(1 + 9) - 3 \times 6$
$= 2 + 3(10) - 3 \times 6$
$= 2 + 30 - 3 \times 6 = 2 + 30 - 18 = 14.$

4) If all the numbers from 1 to 20 are written on cards, and I pick a card at random, what is the probability that the number I pick is prime?

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

$\frac{8}{20} = \frac{4}{10} = \frac{2}{5}$

5) Multiply out and simplify: 2T - 2(T + 1 - 3T)

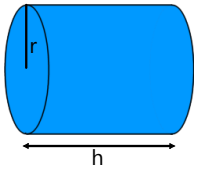
$= 2T - 2T - 2 + 6T$
$= -2 + 6T$

Volume of a Cylinder

12/1/17

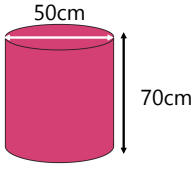
$V = \pi r^2 h$

*not given in exams



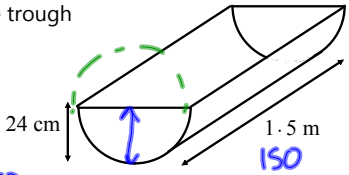
Example 1:

Find the volume in litres, to 3 sig. fig.



$V = \pi r^2 h \qquad r = 25cm$
$= \pi \times 25^2 \times 70$
$= 137446.67...cm^3$
$= 137{,}000 cm^3$ (3s.f.)

2) Find the volume of the trough in litres, correct to 2 d.p.



$V = \pi r^2 h$

$= \pi \times 24^2 \times 150$

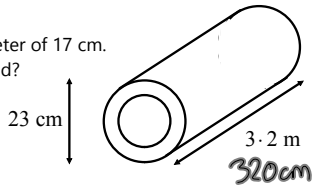
$= 271,433.6053$

$\div 2$

$V_{trough} = 135,716.8026\ cm^3$

$= 135,716.80\ cm^3$ (2dp)

This is a section of a water pipe.
The inside of the pipe has a diameter of 17 cm.
How much water can this pipe hold?



$17 \div 2 = 8.5\ cm$

$V_{inner} = \pi r^2 h$

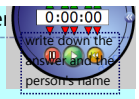
$= \pi \times 8.5^2 \times 320$

$= 72633.6\ldots\ cm^3$

$= 72600\ ml$ (3s.f.)

$= 72.6\ L$.

Starter: Find someone who can tell you the answer



1) Without a calculator, find 0.23 x 1.2 — 0.276

2) Factorise $3m^2 - 4m$ — $m(3m-4)$

3) Multiply out the brackets: $4T(3 - 2T)$ — $12T - 8T^2$

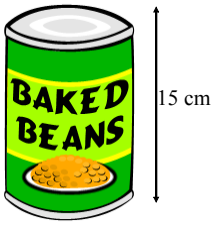
4) List all the primes between 10 and 20 — 11, 13, 17, 19

5) Find the product of a half and a quarter — $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

6) Round 3.0472 to 3 significant figures — 3.05

7) Take 10% off £35.50 — £31.95 — £3.55

8) Divide 500 by 0.5 — 1000



V = 500 cm³

Find the radius of the can.

$V = \pi r^2 h$

$500 = \pi \times r^2 \times 15$

$\div \quad \div 15$

$\frac{500}{15} = \pi \times r^2$

$\div \pi \quad \div \pi$

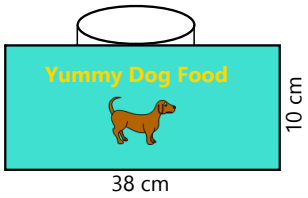
$500 \div 15 \div \pi = r^2$

$r^2 = 10.610\ldots$

$r = \sqrt{10.610}$

$= 3.26$ (3s.f.)

Challenge: This wrapper is curved around a can so its edges just meet. What is the volume of the can?

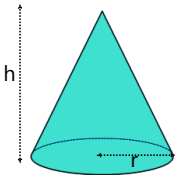


Today's Learning:

To calculate the volume of any cone.

16/11/17

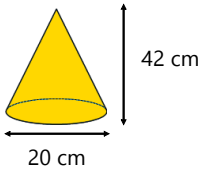
Volume of a Cone



$$V = \frac{1}{3}\pi r^2 h$$

*given in exams

e.g. 1) Calculate the volume of this cone.



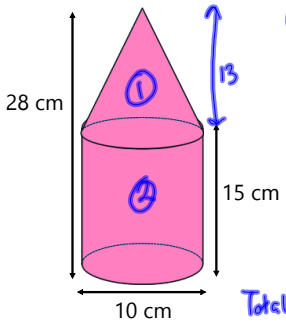
$V = \frac{1}{3} \times \pi \times r^2 \times h$

$= \frac{1}{3} \times \pi \times 10^2 \times 42$

$= 4398.229...$

$= 4400\,cm^3$ (3 s.f.)

2) Calculate the volume of this shape.



① $V = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi \times 5^2 \times 13$

$= 340.339$

② $V = \pi r^2 h$

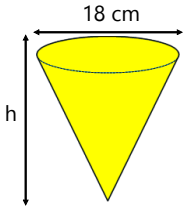
$= \pi \times 5^2 \times 15$

$= 1178.097$

Total vol $= 340.339 + 1178.097$

$= 1518.436...\,cm^3$

$= 1518.44\,cm^3$ (2dp)



This cone can hold 2 litres. Calculate the height of the cone.

$V = \frac{1}{3}\pi r^2 h$

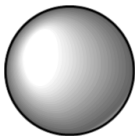
$2000\,cm^3 = \frac{1}{3}\pi \times 9^2 \times h$

$2000 \div \frac{1}{3} \div \pi \div 9^2 = h$

$h = 24$ cm (2 s.f.)

Volume of a Sphere

17/1/17



$V = \frac{4}{3}\pi r^3$

given in exam

e.g. 1) Find the volume of this sphere.

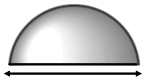
$V = \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times 6^3$

$= 904.778...\,cm^3$

$= 905 cm^3$ (3 s.f.)

e.g. 2) Find the volume of this hemisphere.



$V = \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times 14^3$

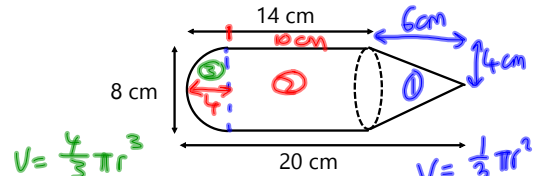
$= 11494.04\,cm^3$

$\div 2$

Volume $= 5747.02 cm^3$

$= 5700 cm^3$ (2 s.f.)

Find the volume of this object, made up of a hemisphere, a cylinder and a cone:



$V = \frac{4}{3}\pi r^3$

$\div 2 = \frac{4}{3} \times \pi \times 4^3$

$= 134.04\,cm^3$

$V = \pi r^2 h$

$= \pi \times 4^3 \times 10$

$= 502.6 cm^3$

$V = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3}\pi \times 4^2 \times 6$

$= 100.5 cm^3$

$737.2 cm^3$

Starter

1) Multiply out the brackets: $3T(2 - T)$ $6T - 3T^2$

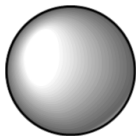
2) Factorise by taking out a common factor: $4mn + 2m^2$ $2m(2n + m)$

3) Calculate $\frac{1}{8} + \frac{3}{5}$ $\frac{29}{40}$

4) Calculate $\frac{2}{5} \times \frac{1}{3}$ $\frac{2}{15}$

5) Calculate 2.3×4 9.2 $\frac{23}{10} \times 4 = 9.2$

The volume of this sphere is 4189 cm^3.
Calculate the radius of this sphere.



$V = \frac{4}{3}\pi r^3$

$4189 = \frac{4}{3} \times \pi \times r^3$

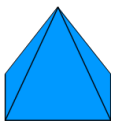
$4189 \div \frac{4}{3} = \pi \times r^3$

$4189 \div \frac{4}{3} \div \pi = r^3$

$r^3 = 1000.05$

$r = \sqrt[3]{1000.05}$

$= 10.0\text{cm}$ (3sf)

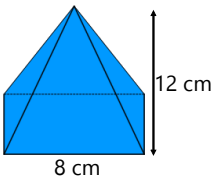


Volume of a Pyramid 18/1/17

$V = \frac{1}{3}$ x base area x perpendicular height

exam gives $V = \frac{1}{3}Ah$

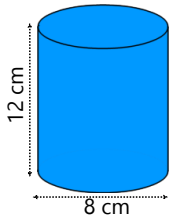
e.g. 1) Find the volume of this square based pyramid.



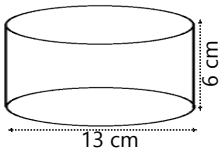
Area $= L \times B$
$= 8 \times 8 = 64\text{cm}^2$

$V = \frac{1}{3}Ah$
$= \frac{1}{3} \times 64 \times 12 = 256\text{cm}^3$

A cylindrical beaker shown on the left is full of water. If the water is poured into the beaker on the right, will it overflow?

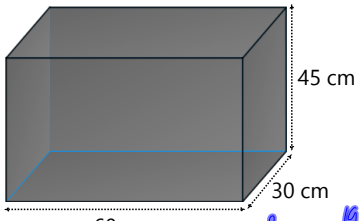


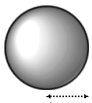
603.18cm^3



796.39cm^3

The rectangular block of metal shown is melted down to make metal balls with radius 1 cm. How many balls can be made?





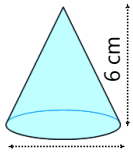
$4.19cm^3$

81,000

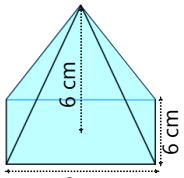
19,337.32

19,337

A paperweight is made of solid plastic. It's height must be 6 cm. The manufacturer must decide between the cone and pyramid shown. Which one requires less plastic to make?



$39.27cm^3$



$72cm^3$

Starter

1) Multiply out the brackets: 3b(e + 2)

$3be+6b$

2) Without a calculator, calculate $\frac{2}{3} - \frac{8}{11}$

$= \frac{22}{33} - \frac{24}{33} = \frac{-2}{33} \quad -\frac{2}{33}$

3) Find the lowest common multiple of 12 and 10.

60

4) Decrease £200 by 45%

£110

10% = £20

40% = £80

5% = £10

5) If the numbers 1 to 100 are written on cards, and I pick one out at random, what is the probability the card has a 9 on it?

$\frac{19}{100}$