Daily Practice **22.2.2016**

Q1. Multiply out and simplify $(3x - 2)(x^2 - 7x + 3)$

$3x^3 - 21x^2 + 9x - 2x^2 + 14x - 6$

$3x^3 - 23x^2 + 23x - 6$

Q2. Factorise fully $3x^2 - 75$

$3(x^2 - 25)$

$3(x + 5)(x - 5)$

Q3. Calculate the value of a house worth £148 000 that appreciated by 3.5% per annum for 3 years $100\% + 3.5\% = 103.5\%$

$148000 \times 1.035^3 = £164\,090.25$

Q4. Calculate the area of an eighth of a circle with diameter 14cm

$A = \frac{\pi r^2}{8} = \frac{\pi \times 7^2}{8} = 19.24 cm^2$ (2d.p.)

L.I: Today we will be revising how to find the volume of a prism.

S.C: We will be able to find the volume of prisms and be able to calculate the height or radius given the volume.

Volume of a prism

22.2.16

- a 3D shape with the same cross-section the whole way through it.

Eg. Triangular prism, cuboid, cylinder, pentagonal prism etc.

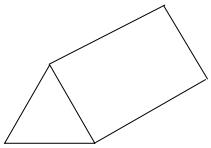
Volume of a Prism = Area Cross-Section × Height

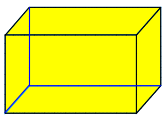
Volume of a prism

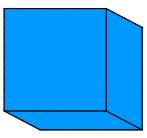
The volume of a prism = Area of Cross Section x Length

Volume of a prism

Use your knowledge of volume of prisms to state the formula for the volume of the following objects.

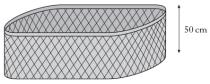






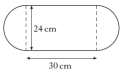
Volume of a prism

Example: Jim Reid keeps his washing in a basket. The basket is in the shape of a prism.



The height of the basket is 50 centimetres.

The cross section of the basket consists of a rectangle and two semi-circles with measurements as shown.



Find the volume of the basket in cubic centimetres.
Give your answer correct to three significant figures.

Volume = Area cross-section × height

$= (L \times B + \pi r^2) \times 50$

$= ((24 \times 30) + (\pi \times 12^2)) \times 50$

$= (720 + 452.39) \times 50$

$= 1172.39 \times 50$

$= 58619.5 cm^3 \rightarrow 58600 cm^3$

Daily Practice 23.2.16

Q1. Multiply out and simplify $(2x + 3)(x^2 + 7x + 4)$

$2x^3+14x^2+8x+3x^2+21x+12$

$2x^3+17x^2+29x+12$

Q2. Simplify $x^3(x^{-5} + 2x^{-3})$

$x^{-2}+2x^0 = \frac{1}{x^2}+2$ $\quad \frac{x^3}{x^3}=1$ $\quad \frac{x^5}{x^5}=x^0$

Q3. Find the value of a house that was purchased for £165 000 and depreciated in value by 3% in its first year and appreciated in value by 4.5% in its second

$165000 \times 0.97 = £160050$

$160050 \times 1.045 = £167252.25$

Q4. $2\frac{1}{3}-\frac{3}{4} = \frac{7}{3}-\frac{3}{4}$

$\frac{28}{12}-\frac{9}{12}$

$=\frac{19}{12}=1\frac{7}{12}$

Q5. Factorise $x^2 + 4x - 12$

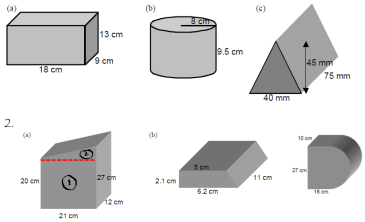
$(x-2)(x+6)$

Today we will be continuing to work out the volume of prisms.

Volume of a prism

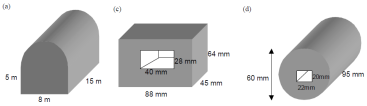
Worksheet

1. Calculate the volume of each shape below.

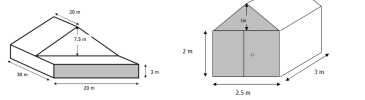


2.

Each shape below has a cross-section made of a rectangle and a semi-circle.

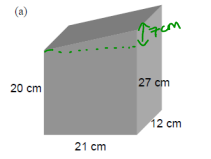


Calculate the volume of each shap



Volume of a prism

2. (a) (b)



Calculate the volume of each shape.

$\left[(21\times20)+(\frac{1}{2}\times21\times7)\right]\times12$

$[420+73.5]\times12$

$5922cm^3$

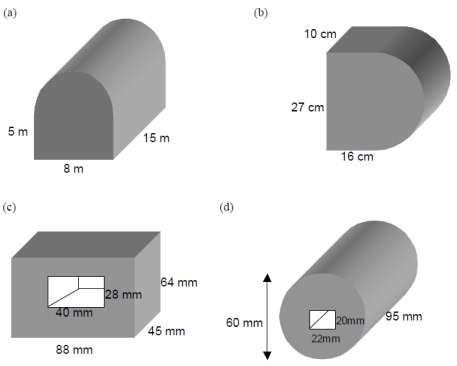
$\left[(2.1\times5)+(\frac{1}{2}\times1.2\times2.1)\right]\times11$

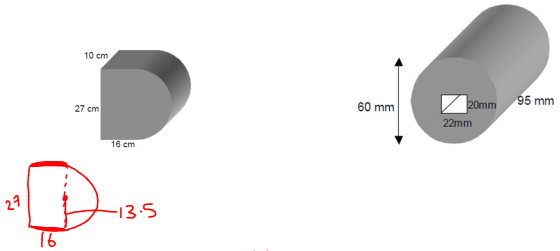
$[10.5+1.26]\times11$

$=129.36cm^2$

Volume of a prism

3. Each shape below has a cross-section made of a rectangle and a semi-circle.





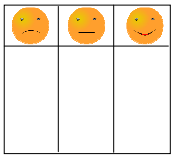
Area cross-section $\times$ height

$\left[(27\times16)+((\pi\times13.5^2)\div2)\right]\times10$

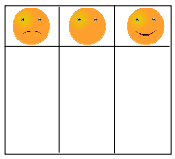
$[432+286.3]\times10 = 7183cm^3$

Success?

I can describe what a prism is.



I can find the volume of a prism.



Daily Practice 24.2.16

Q1. Write 6 million in scientific notation

6×10^6

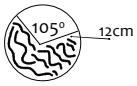
Q2. Multiply out and simplify $(3x - 1)^2$

$9x^2 - 6x + 1$

Q3. Factorise $16 - y^2$

$(4+y)(4-y)$

Q4. Calculate the arc length of the shaded sector



Arc length

$= \frac{x}{360} \times \pi D$

$= \frac{255}{360} \times \pi \times 24$

$= 53.4\text{cm}$

Daily Practice 26.2.16

Q1. Calculate the volume of a cylinder with diameter 16cm and height 24cm

$V = \pi r^2 h$

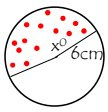
$V = \pi \times 8^2 \times 24 = 4825.49\text{cm}^3$ (2d.p.)

Q2. Multiply out and simplify $(2x - 1)(4 + x)$

$8x + 2x^2 - 4 - x$

$2x^2 + 7x - 4$

Q3. Calculate the angle at the centre of this sector, given that the area is 56cm^2



$A = \frac{x^\circ}{360^\circ} \times \pi r^2$

$56 = \frac{x}{360^\circ} \times \pi \times 6^2$

$\div 6^2\pi \quad \div 6^2\pi$

$0.495\ldots = \frac{x}{360^\circ}$

$x = 0.495\ldots \times 360^\circ$

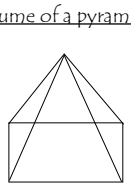
$x = 178.3^\circ$ (1d.p.)

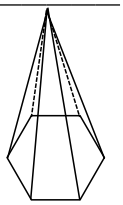
L.I: Today we will be learning how to find the volume of a pyramid and a cone.

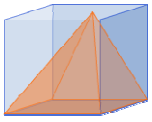
S.C: We will be able to find the volume of a pyramid and a cone.

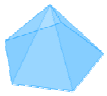
Volume of a pyramid 26.2.16

Types of Pyramids:

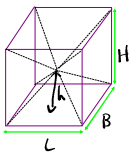






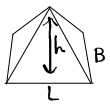


Volume of a pyramid



$V = L \times B \times H$

This cube has been divided into 6 equal square based pyramids.



$V = \frac{L \times B \times H}{6}$

$V = \frac{L \times B \times 2h}{6} \quad \div 2 \quad \div 2$

$V = \frac{L \times B \times h}{3}$

$V = \frac{1}{3} L \times B \times h$

$V = \frac{1}{3} \times \text{Area base} \times h$

Volume of a pyramid

Volume = $\frac{1}{3}$ Area base x Height

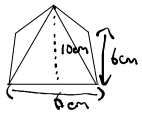
Perpendicular height

Examples:

1. Find the volume of a pyramid with a square base with sides of length 6cm and a height of 10cm

$V = \frac{1}{3}(6 \times 6) \times 10$

$V = \frac{1}{3}(36) \times 10 = 120 cm^3$



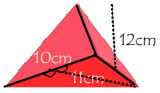
2. Find the volume of the pyramid shown

triangular based

$V = \frac{1}{3}\left(\frac{1}{2} \times 11 \times 10\right) \times 12$

Area base

$V = \frac{1}{3} \times 55 \times 12 = 220 cm^3$



Base

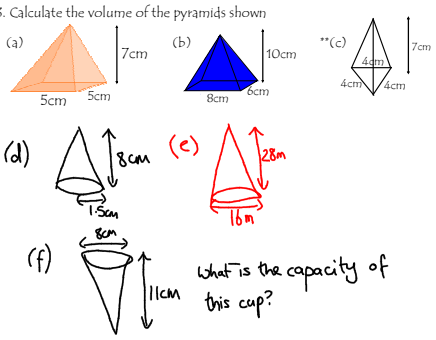
Volume of a pyramid

Questions:

1. A pyramid has a square base of side 7cm and a height of 13cm. Calculate the volume to 2 s.f.

2. A pyramid has a rectangular base measuring 15mm by 14mm and a vertical height of 10mm. Calculate the volume.

3. Calculate the volume of the pyramids shown



Success?

I can describe how the volume of a pyramid is calculated.

I can find the volume of various types of pyramids.

L.I: Today we will be learning how to find the volume of a pyramid and a cone.

S.C: We will be able to find the volume of a pyramid and a cone.

Daily Practice 29.2.16

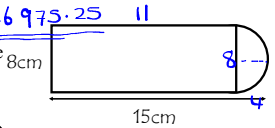
Q1. Calculate the volume of a cone with diameter 12cm and height 19cm.

$V = \frac{1}{3}\pi r^2 h = \frac{1}{3} \times \pi \times 6^2 \times 19 = 716.283 \rightarrow 716.3 cm^3$ (1 dp)

Q2. Find the value of a house that was worth £120 000 and appreciated by 5.2% per annum for 4 years. $100\% + 5.2\% = 105.2\% = 1.052$

$120000 \times 1.052^4 =$ £146 975.25 11

Q3. Calculate the perimeter of this shape

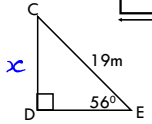


$8 + 11 + 11 + \frac{\pi D}{2}$

$30 + 12.57$

$P = 42.57 cm$

Q4. Calculate the length of DC



$\sin x = \frac{o}{h}$

$\sin 56° = \frac{x}{19}$

$19 \times \sin 56° = x$

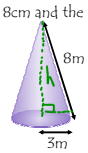
$x = 15.75 m$ (2 dp) = DC

L.I: Today we will be learning how to find the volume of a cone and working backwards.

Homework online due 7.3.16

Volume of Cones: Examples

1. Calculate the volume of this cone given the slant height is 8cm and the radius is 3cm



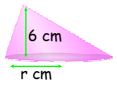
$h^2 = 8^2 - 3^2 = 55$

$h = \sqrt{55} = 7.42m$ (2d.p)

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

$V = \frac{1}{3} \times \pi \times 3^2 \times 7.42 = 69.93\ m^3$ (2d.p.)

2. Calculate the radius given that the volume = 658cm³



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

$658 = \frac{1}{3} \times \pi \times r^2 \times 6$

$\div \frac{1}{3}\pi \times 6 \qquad \div \frac{1}{3}\pi \times 6$

$\frac{658}{6.28} = r^2$

$r^2 = 104.72$

$r = \sqrt{104.72} = 10.23cm$ (2d.p.)

Today we will be continuing to practise questions on the volume of cylinder and cone.

Homework due Monday.

Daily Practice 1.3.2016

Q1. Calculate the height of a cylinder that has a volume of 540cm³ and a radius of 4.5cm (Give your answer to 1 s.f.)

$V = \pi r^2 h$

$540 = \pi \times 4.5^2 \times h$

$h = \frac{540}{\pi \times 4.5^2} = 8.49$

$\rightarrow 8cm$ (1s.f.)

Q2. Multiply out and simplify $(2x - 1)(x^3 + 5x - 4)$

$2x^4 + 10x^2 - 8x - x^3 - 5x + 4$

$2x^4 - x^3 + 10x^2 - 13x + 4$

Q3. State the equation of the line joining (-2, 3) and (0, 1)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-3}{0-(-2)} = \frac{-2}{2} = -1$

$y = mx + c$

$y = -x + 1$

Q4. Factorise $3x^2 - 14x + 8$

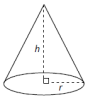
$(x - 4)(3x - 2)$

$-12x$

$-2x$

Volume of a cone

1. Calculate the volume of each cone described below, rounding your answers to 1 decimal place.



(a) $r = 3cm$ and $h = 6cm$

(b) $r = 8mm$ and $h = 12mm$

(c) $r = 3cm$ and $h = 5cm$

(d) $r = 2m$ and $h = 6m$

2. A cone has a base diameter of 8cm and a height of 5cm. Calculate the volume of this cone.

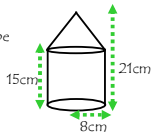
3. A cone has a base diameter of 10cm and a **slant height** of 13cm.

Calculate the volume of the cone.

4. A cone has a base radius of 9cm and a **slant height** of 15cm.

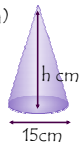
Calculate the volume of the cone.

5. Calculate the total volume of this shape



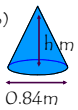
Calculate the missing value for each of the following:

(a)



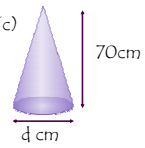
$V = 1800cm^3$

(b)



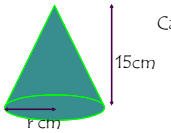
$V = 1.26m^3$

(c)



$V = 16493cm^3$

(d)



Capacity = 2.2L

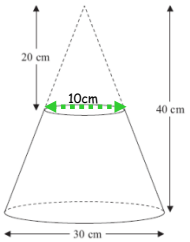
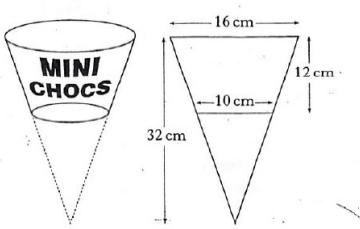


Diagram **NOT** accurately drawn

A frustum is made by removing a small cone from a similar large cone.
The height of the small cone is 20 cm.
The height of the large cone is 40 cm.
The diameter of the base of the large cone is 30 cm.
Work out the volume of the frustum.
Give your answer correct to 3 significant figures.

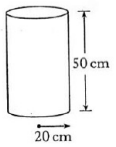
A container to hold chocolates is in the shape of part of a cone with dimensions as shown below.



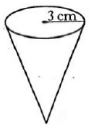
Calculate the volume of the container.
Give your answer correct to one significant figure.

A drinks container is in the shape of a cylinder with radius 20 centimetres and height 50 centimetres.

(a) Calculate the volume of the drinks container.
Give your answer in cubic centimetres, correct to two significant figures. 3

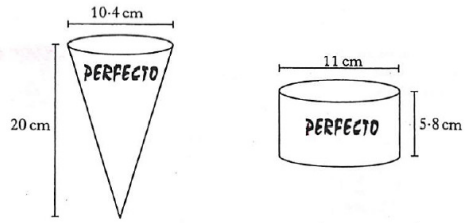


(b) Liquid from the full container can fill 800 cups, in the shape of cones, each of radius 3 centimetres.



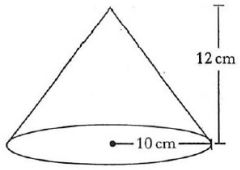
What will be the height of liquid in each cup? 4

Perfecto Ice Cream is sold in cones and cylindrical tubs with measurements as shown below.



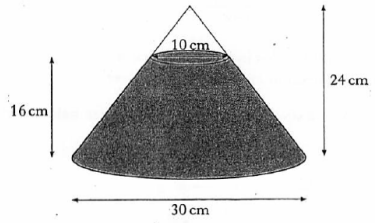
Both the cone and the tub of ice cream cost the same.
Which container of ice cream is better value for money?
Give a reason for your answer. 5

The diagram shows a cone.



The height is 12 centimetres and the radius of the base 10 centimetres.
Calculate the volume of the cone.
Take $\pi = 3{\cdot}14$. 2

A glass ornament in the shape of a cone is partly filled with coloured water.



The cone is 24 centimetres high and has a base of diameter 30 centimetres.
The water is 16 centimetres deep and measures 10 centimetres across the top.
What is the volume of the water?
Give your answer correct to 2 significant figures. 5

Daily Practice 2.3.16

Q1. Round 814403 to 2 significant figures

Q2. Multiply out and simplify $(2x - 1)(x^2 - 3x - 4)$

Q3. Factorise fully $50x^2 - 8$

Q4. Calculate the length of an arc that has angle at centre 15° and radius 28cm

L.I: Today we will be learning how to calculate the volume of a sphere and volume problem solving questions.

S.C: We understand the formula for the volume of a sphere and can apply it to questions containing spheres and hemispheres.

Homework Online due 7.3.16

Volume of a sphere

The volume of a sphere is found using Integration, a type of Maths in the Higher Course. You will be given the formula in your exam.

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

Volume of a sphere

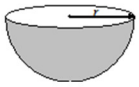
Examples:

1. Calculate the volume of a sphere with diameter 8cm

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

$V = \frac{4}{3} \times \pi \times 4^3 = 268.08cm^3$

2. Calculate the volume of a hemisphere with radius 7cm



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

$V = \frac{4}{3} \times \pi \times 7^3 \div 2$

$V = 718.38cm^3$

Volume of a sphere

3. Calculate the radius of this sphere given the volume is 780cm³