



# Grange Academy

## Expressions and Formulae

### Unit 1 Assessment Practice

1. Simplify, giving your answer in surd form:

$$\sqrt{75} \quad (1)$$

- 2a. Simplify:

(i)  $\frac{t^5 \times t^4}{t^3}$  (2)

(ii)  $4p^3 \times 5p^{-\frac{1}{4}}$  (2)

- 2b. Large distances in space are measured in light years. One light year is  $9.46 \times 10^{12}$  km.

Calculate the number of kilometres in 13 light years in scientific notation. (2)

- 3 Expand and simplify where appropriate:

a.  $f(7f - y)$  (1)

b.  $(k + 6)(k - 2)$  (2)

4. Factorise:

a.  $r^2 + 13r$  (1)

b.  $h^2 - 81$  (1)

c.  $d^2 + 8d - 20$  (2)

5. Express  $x^2 + 10x - 12$  in the form  $(x + p)^2 + q$  (2)

6. Write 
$$\frac{(2x - 3)(x + 1)}{(x + 1)^2} \quad x \neq -1$$
 in its simplest form. (2)

7. Write each of the following as a single fraction:

a.  $\frac{4}{v} + \frac{2}{w} \quad v, w \neq 0$  (2)

b.  $\frac{9}{e} - \frac{3}{s} \quad e, s \neq 0$  (2)

c.  $\frac{h}{4r} \times \frac{8p}{3} \quad r \neq 0$  (1)

d.  $\frac{b}{7} \div \frac{k}{t} \quad k, t \neq 0$  (2)

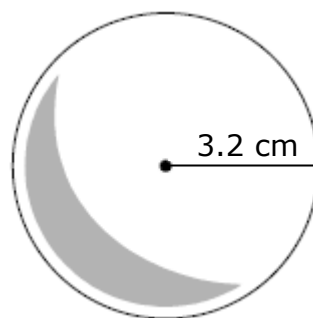
8. Points C and D have coordinates  $(-3, 2)$  and  $(4, 5)$  respectively.

Calculate the gradient of CD. (2)

9. Calculate the volume of a sphere with radius 3.2cm.  
Give your answer to two significant figures.

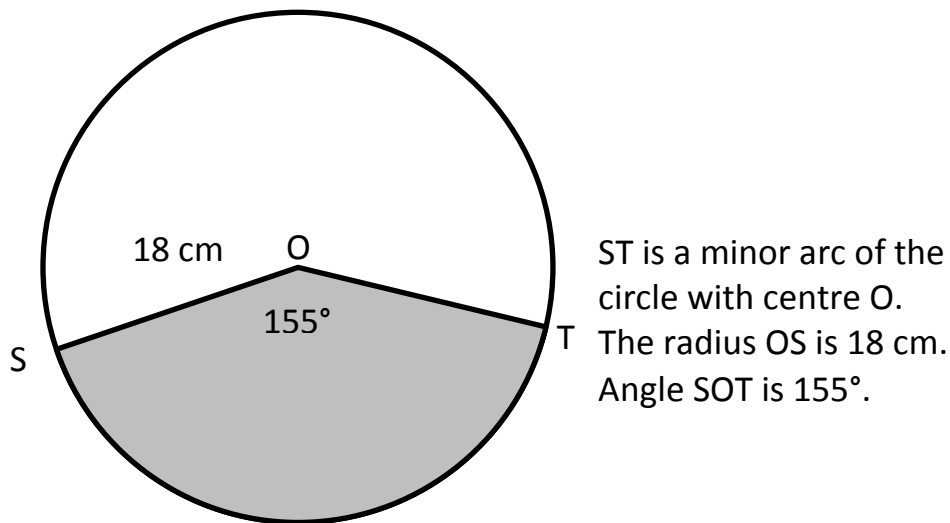
Sphere Volume:

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




(3)

10. Ashwan is designing cardboard party hats for the S4 Christmas party. In the diagram below the shaded area represents the cardboard used in one of these hats.




- a. Calculate the length of minor arc ST. (1)
- b. Ashwan wants to put tinsel around the base of the hats. He has 100 metres of tinsel in stock. What is the maximum number of hats he can make from the 100 metres? (1)  
#2.1  
#2.2

11. A chemist's flask, in the shape of a cone. It has a radius of 6cm and a height of 12 cm. The flask is full of liquid.

$$V_{\text{cone}} = \frac{1}{3} \pi r^2 h$$


(2)  
#2.1  
#2.2

The liquid is poured into a cylindrical beaker of radius 2.5cm and height 9cm.

$$V_{\text{cylinder}} = \pi r^2 h$$


Will the beaker hold the liquid or will it overflow?

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**END OF ASSESSMENT**