Year 11 : Numeracy Mock Prep

Paper 1 : No Calculator Sheet 1

1) £720 was Jack's share of an amount of money which had been split between Jane, Jack and Paula in the ratio 7 : 9 : 2.
How much did Jane get?
How much did Paula get?

9 ratio parts = 720
1 ratio part = 720/9 = 80
∴ Jane 7 ratio parts = 7 × 80 = £560

Paula 2 ratio parts = 2 × 80 = £160

2) £4000 is invested in a bank for 3 years. The bank pays 10% p.a. compound interest.
Calculate the value of the investment after the 3 years.

Year 1
End Total = 4000 + 400 = £4400

Year 2
End Total = 4400 + 440 = £4840

Year 3
End Total = 4840 + 484 = £5324

3) A field is in the shape of a rectangle. The field has a fence erected around it.
- The length of the field is 3x as much as the width.
- The perimeter of the field is 400m. ie 400m of fencing is needed.

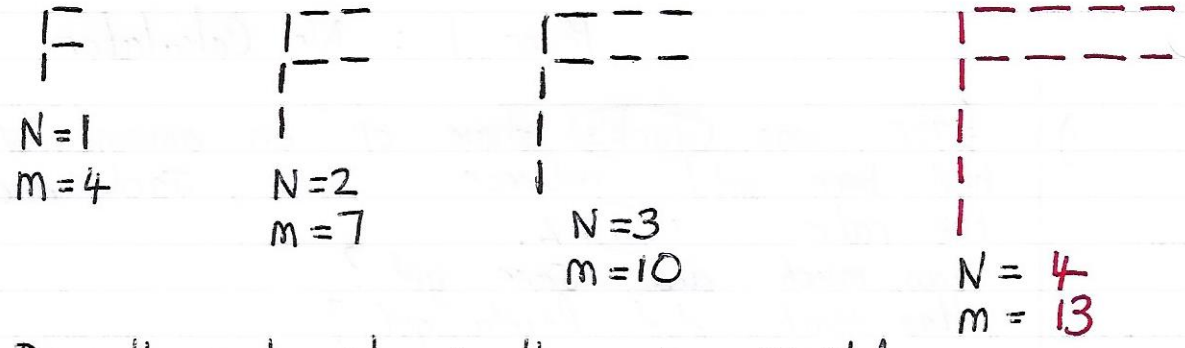
Find the length and width of the field.

(Hint : set up an equation first)

$3x + x + 3x + x = 400$
$8x = 400$
$x = \frac{400}{8} = 50$

∴ Length = 3x = 3(50) = 150m
Width = x = 50m

4) Here are a sequence of pictures made from matchsticks



N = 1
m = 4

N = 2
m = 7

N = 3
m = 10

N = 4
m = 13

a) Draw the next picture in the space provided.

b) Complete the results table for picture number N and number of matchsticks m

N	1	2	3	4	5
m	4	7	10	13	16
		+3	+3	+3	+3

c) Find a formula linking N and m

$m = 3N + 1$ ← because +3 pattern

d) Use the formula to find how many matches for N = 20

$m = 3(20) + 1$ $\quad m = 60 + 1$ $\quad m = 61$

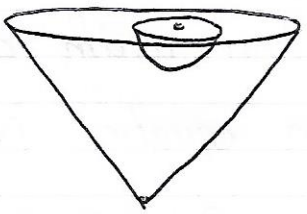
e) Use the formula to find which picture number uses 151 matches

$151 = 3N + 1$

$151 - 1 = 3N$ $\quad \frac{150}{3} = N$

$150 = 3N$ $\quad 50 = N$

5) The diagram shows a cone which has a hemispherical hole cut out from the end (upper circular face).



- The radius of the cone is 10cm
- The height of the cone is also 10cm
- The radius of the hemisphere is 3cm

a) Show the volume that remains after the hole is removed is $\frac{946}{3}\pi$ cm^3.

V = cone − hemisphere

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

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

$V = \frac{1000\pi}{3} - 18\pi$

$V = \frac{1000\pi}{3} - \frac{54\pi}{3}$

$V = \frac{946\pi}{3}$ cm^3

b) The top face after the hole is removed is to be painted, but not inside the hole. Calculate the area to be painted. Leave π in your answer.

Area needed = ○ − ○

$= \pi R^2 - \pi r^2$

$= (\pi \times 10^2) - (\pi \times 3^2)$ cm^2

$= 100\pi - 9\pi = 91\pi$