

SAT REVISION; Number

ALL LEVELS.

1) The table shows the lengths of some rivers to the nearest km.

River	Length in km to the nearest km	Length in km to the nearest 100km	Length in km to the nearest 10km
Severn	354	400	350
Thames	346		
Trent	297		

a) Copy and complete the table.

b) There is another river which is not on the list.

It has a length of **200km** to the **nearest 100km**, and a length of **150km** to the **nearest 10km**.

Write down one possible length of the river to the nearest km.

c) Two more rivers have **different** lengths to the nearest km. They both have a length of **250km** to the **nearest 10 km**, but their lengths to the **nearest 100km** are **different**.

Write down possible lengths of each river.

2) You can make different colours of paint by mixing red, blue and yellow in different proportions. For example, you can make green by mixing **1 part blue** to **1 part yellow**.

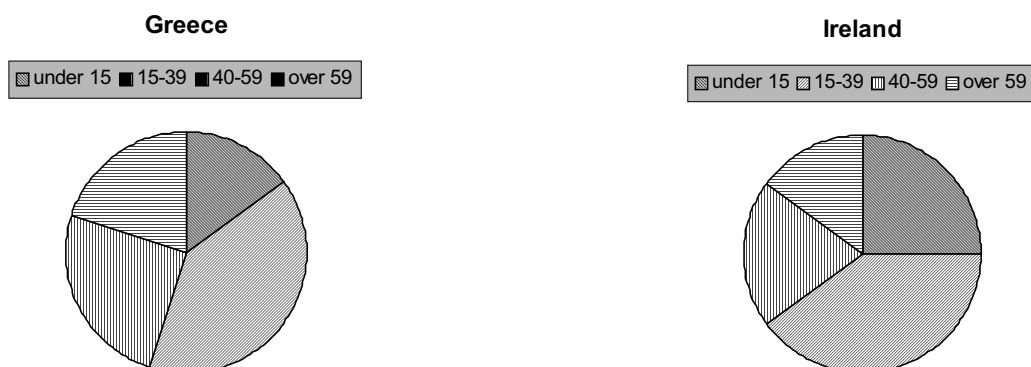
a) To make purple, you mix **3 parts red** to **7 parts blue**.

How much of each colour do you need to make **20 litres** of purple paint?

b) To make orange, you mix **13 parts yellow** to **7 parts red**.

How much of each colour do you need to make **10 litres** of orange paint?

3) These pie charts show some information about the ages of people in Greece and in Ireland. There are about 10 million people in Greece, and about 3.5 million people in Ireland.



a) Roughly what **percentage** of people in **Greece** are aged **40–59** ?

b) There are about **10 million** people in Greece. Use your percentage from part a) to work out roughly **how many** people in Greece are aged **40–59**.

c) Dewi claims that the charts show that there are more people **under 15** in **Ireland** than in **Greece**. Explain why the charts do **not** show this.

- d) There are about 60 million people in the UK. The table shows roughly what percentage of people in the UK are of different ages.

under 15	15 – 39	40 – 59	over 59
20%	35%	25%	20%

Draw a pie chart to show this information.

- 4) The table shows the land area of each of the world's continents.

continent	land area (in 1000 km ²)
Africa	30 264
Antarctica	13 209
Asia	44 250
Europe	9 907
North America	24 398
Oceania	8 534
South America	17 793
World	148 355

- a) Which continent is approximately 16% of the World's land area?
 b) What percentage of the World's land area is **Asia**?
 c) About **30%** of the World's area is **land**. The rest is water. The amount of **land** in the world is about **150 million km²**.

Work out the approximate **total area** (land and water) of the world.

- 5) Look at the table:

	1961	1994
England	17.6	
Wales	17.0	12.2

- a) In England, from 1961 to 1994, the birth rate **fell** by 26.1%. What was the birth rate in England in 1994?
 b) In Wales, the birth rate also fell. Calculate the **percentage fall** from 1961 to 1994.

- 6) a) Use **£1 = 9.60 francs** to work out how much **45p** is in francs. Show your working.

b) Use **240 pesetas = £1** to work out how much **408 pesetas** is in pounds. Show your working.

c) Use **£1 = 9.60 francs** and **£1 = 240 pesetas** to work out how much **1 franc** is in **pesetas**.

- 7) The ship 'Queen Mary' used to sail across the Atlantic Ocean.

The ship's usual speed was **33 miles per hour**.

On average, the ship used fuel at the rate of **1 gallon** for every **13 feet** sailed.

Calculate how many gallons of fuel the ship used in one hour of travelling at the usual speed. (There are 5280 feet in one mile.)

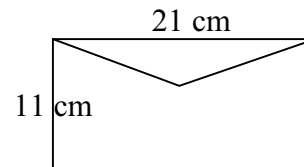
Show your working and write down the **full calculator display**.

Now write your answer correct to **2 significant figures**.

- 8) a) The length of an envelope is 21 cm to the nearest cm.

Write the smallest possible real length of the envelope.

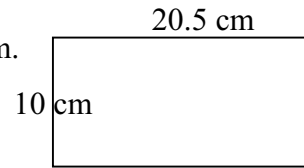
Write the greatest possible real length of the envelope.



- b) The length of a card is 20.5 cm to the nearest **tenth** of a cm.

Write the smallest possible real length of the card.

Write the greatest possible real length of the card.



- c) Can you be sure that the card will fit in the envelope? Explain your answer.

- 9) At an athletics meeting, the discus throws are measured to the nearest centimetre.

- a) Viv's best throw was measured as 35.42m. Could Viv's throw actually have been more than 35.42m? Explain your answer.

- b) Chris won the hurdles race in a time of 14.6 seconds measured to the nearest tenth of a second.

Between what two values does Chris's time actually lie?

LEVEL 8 ONLY.

- 1) **[NO CALCULATOR.]**

In **1995**, the Alpha Company employed 4000 people.

For **each** of the next **2 years**, the number of people employed increased by **10%**.

1995	employed 4000 people
1996	employed 10% more people
1997	employed 10% more people

- a) Tony said: "Each year, the Alpha Company employed another 400 people."

Tony was wrong. Explain why.

- b) Which calculation below shows how many people worked for the company in **1997**.

$$4000 \times 0.1 \times 0.2$$

$$4000 \times 0.1^2$$

$$(4000 \times 0.1)^2$$

$$4000 \times 1.1 \times 2$$

$$4000 \times 1.1^2$$

$$(4000 \times 1.10)^2$$

- c) Look at these figures for the Beta Company:

1995	employed n people
1996	employed 20% fewer people
1997	employed 10% more people

Write an expression using n to show how many people the company employed in **1997**.
Show your working and write your expression as simply as possible.

- 2) A clothes shop had a closing down sale. The sale started on Tuesday and finished on Saturday. For each day of the sale, prices were reduced by 15% of the prices on the day before.
- a) A shirt had a price of £19.95 on Monday. Kevin bought it on Wednesday. How much did he pay?
- b) Ghita bought a dress on Tuesday for £41.48. What was its price on Monday?
- c) A jacket had a price of £49.95 on Monday. What was its price on Friday?
- d) Another shop is reducing its prices each day by 12% of the prices on the day before. How many days would it take for its original prices to be reduced by more than 50%.

3) **[NO CALCULATOR.]**

a) Which of the following statements is true? Answer A, B or C as appropriate.

- A: 4×10^3 is a larger number than 4^3 ,
 B: 4×10^3 is the same size as 4^3 ,
 C: 4×10^3 is a smaller number than 4^3 .

Explain your answer.

b) Which one of the numbers below has the same value as 3.6×10^4 .

- 36^3 , 36^4 , $(3.6 \times 10)^4$, 0.36×10^3 , 0.36×10^5 .

c) Which one of the numbers below has the same value as 2.5×10^{-3} .

- 25×10^{-4} , 2.5×10^3 , -2.5×10^3 , 0.00025 2500 .

d) $(2 \times 10^2) \times (2 \times 10^3)$ can be written more simply as 4×10^5 . Write the following values as simply as possible:

- i) $(3 \times 10^2) \times (2 \times 10^{-2})$, ii) $\frac{6 \times 10^8}{2 \times 10^4}$.

4) Write the following numbers in standard form: a) 310, b) 25500, c) 8, d) 0.0045.

5)

Speed of light is about	1.1×10^9 km per hour
Speed of sound is about	1.2×10^3 km per hour

- a) Calculate the speed of light in km per second. Give your answer in standard form.
- b) How many times as fast as the speed of sound is the speed of light? Give your answer to an appropriate degree of accuracy.
- c) Gary sees a flash of lightning. 25 seconds later he hears the sound of thunder.

Calculate how far away he is from the lightning. (You do **not** need to include the speed of light in your calculation.) Show your working.

- 6) Wendy is making a scale model of the Earth and the Moon for a museum. She has found out the diameters of the Earth and the Moon, and the distance between them in centimetres.

Diameter of the Earth	1.28×10^9 cm
Diameter of the Moon	3.48×10^8 cm
Distance between Earth and Moon	3.89×10^{10} cm.

- a) How many times bigger is the diameter of the Earth than the diameter of the Moon?
- b) In Wendy's scale model, the diameter of the Earth is 50 cm. What should be the distance between the Earth and the Moon in Wendy's model?

- 7) Sir Isaac Newton (1642-1727) was a mathematician, physicist and astronomer. In his work on the gravitational force between two bodies, he found that he needed to multiply their masses together.

- a) Work out the value of the mass of the Earth multiplied by the mass of the Moon. Give your answer in standard form.

Mass of Earth	5.98×10^{24} kg
Mass of Moon	7.35×10^{22} kg

Newton also found that he needed to work out the square of the distance between the two bodies.

- b) Work out the square of the distance between the Earth and the Moon. Give your answer in standard form.

Newton's formula to calculate the gravitational force (F) between two bodies is $F = \frac{Gm_1m_2}{R^2}$ where

G is the gravitational constant, m_1 and m_2 are the masses of the two bodies, and R is the distance between them.

- c) Work out the gravitational force (F) between the Sun and the Earth using the formula

$$F = \frac{Gm_1m_2}{R^2} \text{ with the information in the box below.}$$

Give your answer in standard form.

$m_1m_2 = 1.19 \times 10^{55} \text{ kg}^2$
$R^2 = 2.25 \times 10^{16} \text{ km}^2$
$G = 6.67 \times 10^{-20}$

ANSWERS.

ALL LEVELS.

- 1) a) Thames 346 300 350
Trent 297 300 300.
b) Any answer between 150 to 154km.
c) One between 245 to 249 km, the other between 250 and 254 km.
- 2) a) 6 parts red, 14 parts blue, b) 6.5 parts yellow, 3.5 parts red.
- 3) a) about 25%, b) about 2.5 million,
c) the charts show that in Ireland there is a greater percentage of the population than in Greece who are under 15. **They say nothing about actual numbers etc.** d) Angles 72° , 126° , 90° , 72° .
- 4) a) North America, b) 29.8%, c) 500 million km^2 .
- 5) a) 13.0, b) 28.2%.
- 6) a) 4.32 francs, b) £1.70, c) 25 pesetas.
- 7) 13403.07692 gallons, 13000 to 2 significant figures.
- 8) a) Smallest = 20.5 cm, greatest = 21.5 cm,
b) smallest = 20.45 cm, greatest = 20.55 cm,
c) The card will not necessarily fit in the envelope as the largest possible card will not fit in the smallest possible envelope.
- 9) a) The distance could have been rounded down, b) 14.55 seconds and 14.65 seconds.

LEVEL 8.

- 1) a) In 1996 there were 4400 people employed, an increase of 400.
In 1997 there were 4840 people employed, an increase of 440; **not 400.**
Alternatively. 10% of the 1996 figure is not 10% of 4000 etc.
b) 4000×1.1^2 . {Multiplying a number by 1.1 increases the number by 10%, can you see why?} c) In its' simplest form, $n \times 0.88$. { $n \times 0.8 \times 1.1$.}
- 2) a) { $\pounds 19.95 \times 0.85^2$; why?} $\pounds 14.41$,
b) {Use the fact that 85% of Monday price = $\pounds 41.48$ to work out 1% etc.} $\pounds 48.80$,
c) $\pounds 26.07$,
d) {Try starting with $\pounds 100$ and see on which day the amount is reduced to less than $\pounds 50$ etc.} 6 days.
- 3) a) A, b) 0.36×10^5 ,
c) 25×10^{-4} , d) i) 6×10^0 or simply 6, ii) 3×10^4 .
- 4) a) 3.1×10^2 , b) 2.55×10^4 ,
c) 8×10^0 , d) 4.5×10^{-3} .
- 5) a) 3.055555555×10^5 ,
b) {Use brackets!} 916666.6666 or 920000 to 2 significant figures,
c) {First calculate how far sound travels in one second in a similar way to a) etc.} 8.333333333 km.
- 6) a) {Divide! Don't forget the brackets!} 3.678,
b) {First work out what distance 1 cm on the scale model represents etc.} 1519.53 cm.
- 7) a) 4.3953×10^{47} , b) 1.51321×10^{11} ,
c) {Take care with brackets!} 3.5277×10^{19} .