

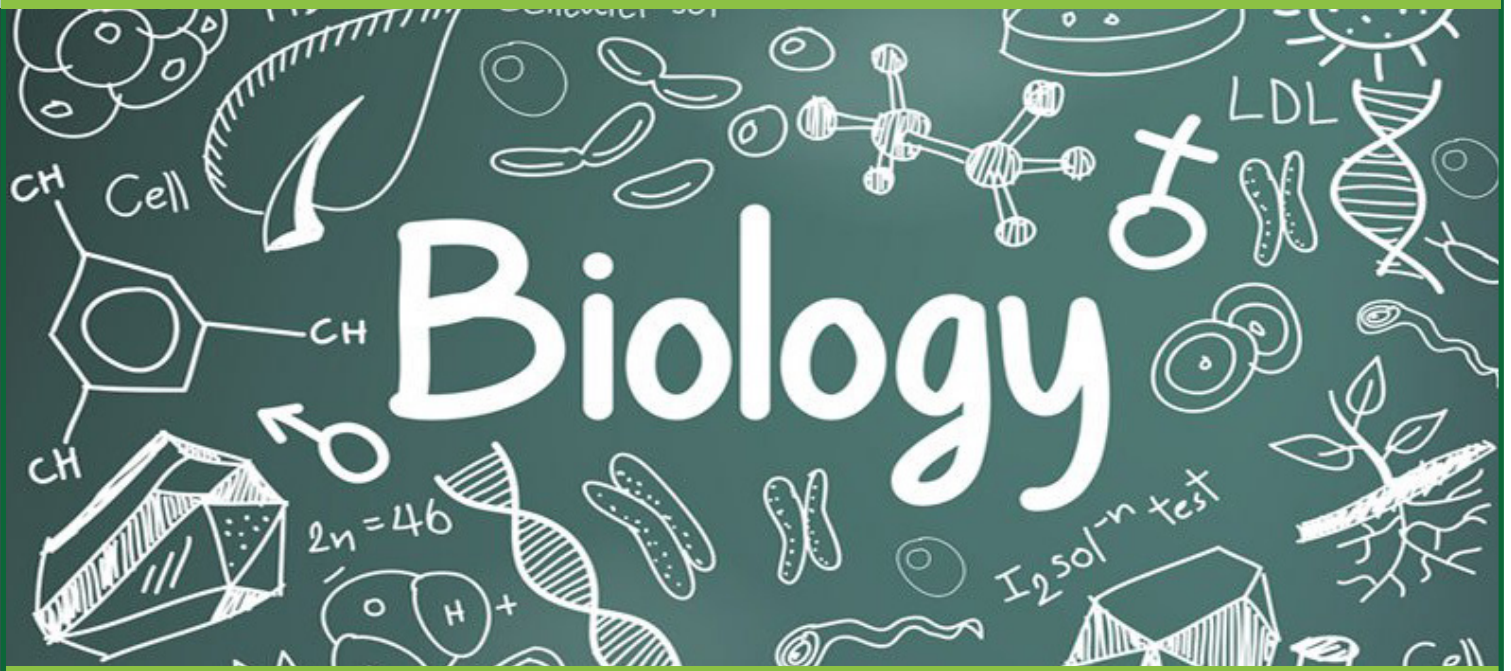


Bentley Wood

High School for Girls

Biology Bridging Work

Year 10 into 11 for 2024/25



Name: _____

Tutor Group: _____

Teacher: _____

Year 10 into 11 Biology Bridging Work

Congratulations on completing Year 10 and entering the final stage of your biology journey! This bridging work will help you review and reinforce key ideas from Year 10, ensuring a supported transition into Year 11.

There are four sections to this booklet. These are:

1. Reviews of each Required Practical you have covered so far in biology with an opportunity to review different aspects of individual practical work;
2. Exam Question Practice – get into the mindset of an examiner! Practice some commonly tested exam questions in biology with top tips from our exam board, AQA.
3. Autumn Term Preparation

Together with this, there will be links to useful videos that directly link to the module/topic in case you need further support. Please also use your CGP and Kerboodle textbooks to support with your revision.

Recommended Websites:

- Savemyexams
- BBC Bitesize
- AHammondBiology
- Thesciencehive

This is the first piece of work you will be assessed in September and will set the tone for the rest of the academic year. It's an opportunity for you to showcase your knowledge, skills, and growth since Year 10. Work hard, stay focused, and demonstrate what you are capable of achieving.

Section 1: Required Practicals

Recommended Videos (remember the practical you do in school vs the one in the exam can vary):

1. Osmosis – measuring mass change of potato discs in different solutions
 - a. [Osmosis - Malmesbury Education](#)
 - b. [Osmosis - Free Science Lessons](#)
2. Enzymes – measuring time taken for amylase to digest starch
 - a. [Enzymes - Malmesbury Education](#)
 - b. [Enzymes - Free Science Lessons](#)
3. Photosynthesis – measuring the rate of photosynthesis in different light intensities
 - a. [Photosynthesis - Malmesbury Education](#)
 - b. [Photosynthesis - Free Science Lessons](#)
4. Distribution – measuring number of plants in different areas (sunny/shaded)
 - a. [Distribution - Malmesbury Education](#)
 - b. [Distribution - Free Science Lessons](#)

For any practical activity can students answer these 10 questions?

1. What is the dependent variable and the independent variable?
2. Therefore, what other factors could affect the results and need to be controlled (control variables)?
3. What will I measure or record?
4. What would an appropriate experimental control be?
5. How could I improve the accuracy of my experiment/investigation?
6. How could I improve the precision of my experiment/investigation?
7. How could I improve the validity of my experiment/investigation?
8. What else could I do with this experiment? What could I change to investigate something else?
9. What is my greatest source error?
10. What pattern or trend do my results show and how do I explain this?

Please note because not all investigations have all these characteristics, not all of these questions can be answered for all Required Practicals.

Required Practical 3: Osmosis

A science class is investigating the effect of sugar solutions on the mass of a potato slice.

The sugar solutions are shown in Table 1:

Mass of Sugar (mg)	Volume of Water (mL)	Concentration (mg/mL)
2.5	5	0.5
4	4	1
10	5	
12	3	4
16	2	8

Table 1

1. Fill in the gap in the table.

The potato pieces were all cut to the same size, and all weighed 1 g. After 1 hour, the potato slices were weighed again and the data recorded.

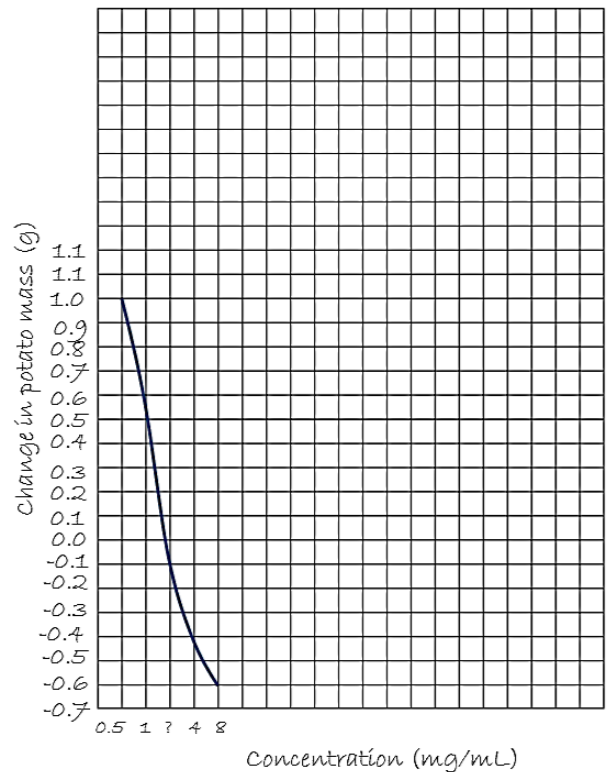
2. What other factors should be controlled during this experiment?

One student plotted the following graph to express the data.

3. How should this graph be changed to make it better?

Samantha performs the experiment again with higher concentrations of sugar in the water.

4. What observation would you expect?



5. Calculate the percentage decrease in the mass of the potato between 0.5 mg/mL and 1.0 mg/mL.

Required Practical 5: Enzymes

A class are testing the effect of pH on how well amylase digests starch. They test the time taken for iodine to stop changing colour.

They produce the graph in Figure 1:

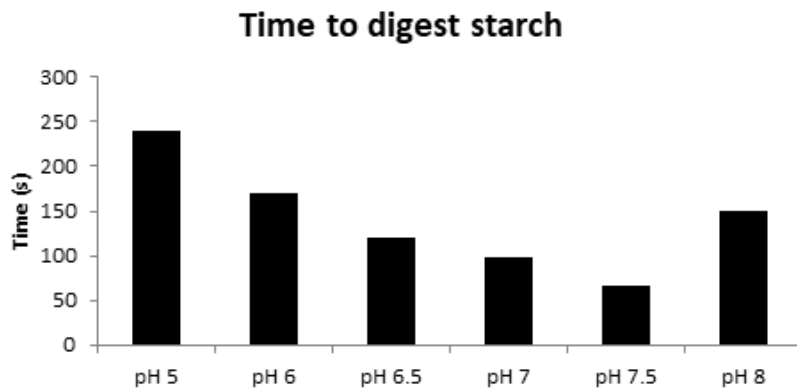


Figure 1

1. What group of chemicals does amylase belong to?
2. Explain how you can use these results to identify the optimal pH for amylase action.
3. How could the class speed the digestion of starch further?

Another class repeated this experiment. They performed the experiment at 42 °C.

4. What would you expect the observations to be during this experiment?

A machine called a 'colorimeter' is able to measure the exact colour of a solution.

5. How could a colorimeter help with this experiment?
- 6.

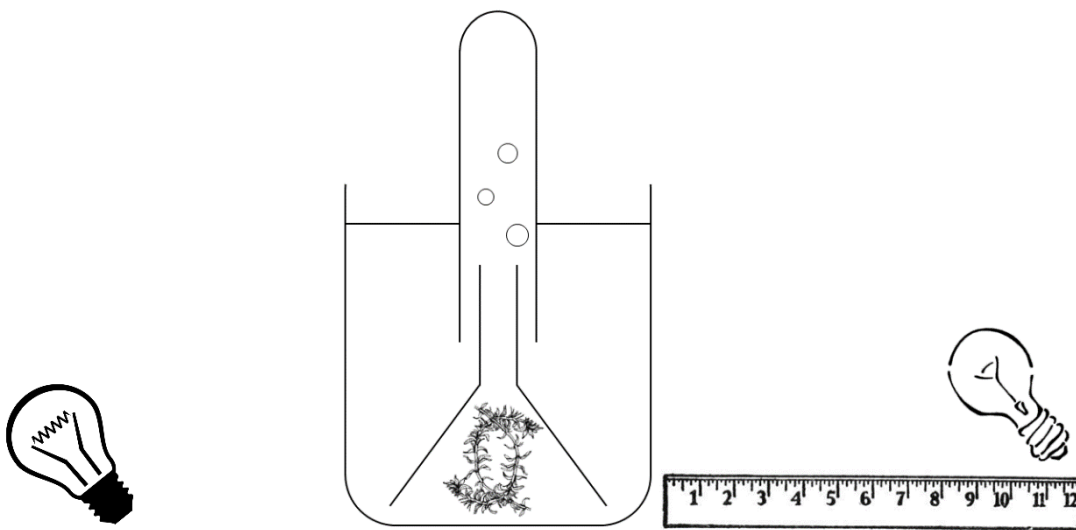
Required Practical 6: Photosynthesis

A class is investigating the effect of light on photosynthesis.

They have some pondweed beneath a tube filled with water, and a light bulb shining on the plant.

Carbon dioxide is kept constant throughout.

The set-up of their experiment is shown in Figure 1.



1. Which gas is represented by the bubbles in the tube?
2. Using the equipment above, devise an experiment to test the effect of light intensity on the rate of photosynthesis. Identify any safety precautions that should be considered.
3. Write a hypothesis for this experiment.

Photosynthesis is also affected by temperature.

4. How could this experiment be adapted to test the effect of temperature on photosynthesis? What safety precautions should be considered?

Section 2: Exam Question Practice

Recommended Video: [Vaccination - Cognito Science](#)

Vaccination can be used to prevent an illness in a person.

Explain how a vaccination can prevent an illness.

(4)

Recommended Video: [Reflex Arc - Cognito Science](#)

A woman’s hand accidentally touches a hot object.

The woman moves her hand away rapidly.

Describe how the woman’s nervous system coordinates the reflex action.

(6)

Recommended Video: [Endocrine System - Cognito Science](#)

The endocrine system coordinates many internal functions of the body.

Give three ways coordination by the endocrine system is different from coordination by the nervous system.

1 _____

2 _____

3 _____

(3)

Recommended Video: [Menstrual Cycle - Cognito Science](#)

Describe how hormones control the menstrual cycle.

(5)

Section 3: Maths for Biology

2.1 HANDLING DATA

1. Write 25198 to three significant figures.

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2. A gardener grew some tomato plants. She noted how many tomatoes she got from each plant:

25 20 28 18 25 26 31 25 34

- a) Calculate the **mean** number of tomatoes per plant.

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- b) Write down the **median** number of tomatoes per plant.

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- c) Write down the **modal** number of tomatoes per plant.

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3. A wildlife rescue centre kept records of the types of wild mammals that came into their care. These were their results for one week.

Hedgehog	Hedgehog	Fox	Hedgehog	Vole	Fox
Vole	Vole	Badger	Fox	Badger	Deer
Hedgehog	Hedgehog	Vole	Badger	Vole	Hedgehog
Fox	Fox	Hedgehog	Vole	Vole	Hedgehog

- a) Design a frequency table for these data.

- b) Display the data using a suitable chart.

2.1 HANDLING DATA (CONTINUED)

4. There are 120 students in Year 11. The head of year wants to select six students at random to take part in a planning committee. Suggest a method she could use to choose the students randomly.

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5. A bag contains one red ball, two blue balls and five yellow balls. You pick a ball out of the bag without looking. What is the probability that the ball will be:

- a) blue?
- b) not red?

6. The table shows the heights and shoe sizes of a group of adults.

Height (m)	UK shoe size
1.52	4
1.77	10
1.62	6
1.70	7
1.75	9
1.65	6
1.80	12
1.60	5

- a) Draw a graph of these data.
- b) Describe the relationship between height and shoe size for this group of people.

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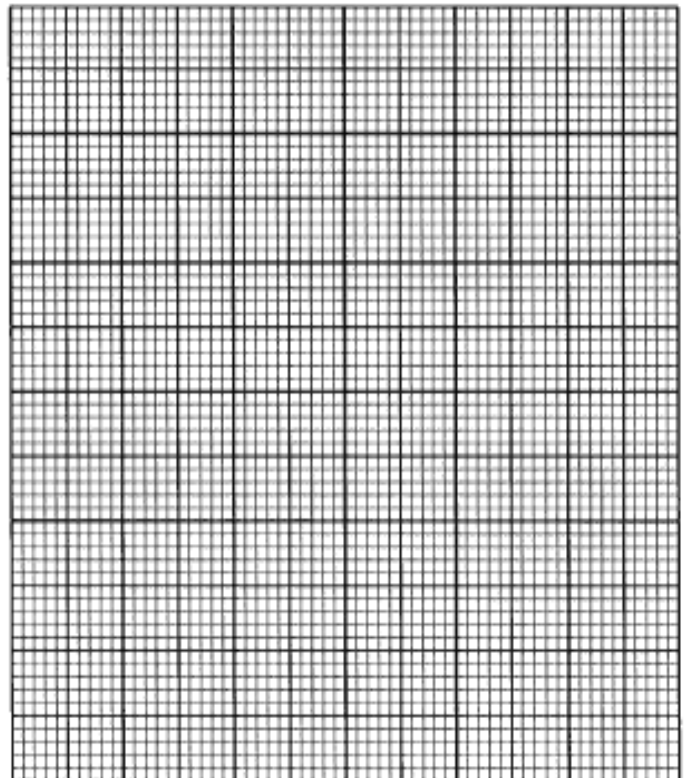
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7. A rectangular field is 150 m wide by 200 m long. What is the order of magnitude of the area of the rectangle, in square metres (m²)?

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Percentages and percentage change

- ★ 'Per cent' (%) means 'out of 100', so a percentage is a fraction with 100 as the denominator.
- ★ If 70 per cent of the population has a mobile phone, this means that 70 out of every 100 people have one.

Converting fractions, decimals and percentages

Here are some conversions you should try to remember if you can – it will make life easier! They are:

fraction	decimal	percentage
$\frac{1}{2}$	0.5	50 %
$\frac{1}{4}$	0.25	25 %
$\frac{1}{10}$	0.1	10 %
$\frac{1}{3}$	0.3333...	33.3 %
$\frac{1}{100}$	0.01	1 %

- ★ To change a fraction to a percentage, multiply it by 100.
 $\frac{2}{5}$ converted to a percentage is $\frac{2}{5} \times 100 = \frac{200}{5} = 40 \%$
- ★ To change a percentage to a fraction, put 100 as the denominator, then cancel it down.
 64 % expressed as a fraction is $\frac{64}{100} = \frac{32}{50} = \frac{16}{25}$
- ★ To change a decimal to a percentage, multiply by 100 on your calculator or move the decimal point two places to the right, like this:
 0.62 expressed as a percentage is 62 %
 0.375 expressed as a percentage is 37.5 %
- ★ To change a percentage to a decimal, divide by 100 on your calculator or move the decimal point two places to the left, like this:
 73.5 % expressed as a decimal is 0.735
 60 % expressed as a decimal is 0.60, or just 0.6
 5 % expressed as a decimal is 0.05 – be careful with this one

Finding a percentage of an amount

A percentage is another way of writing a fraction with a bottom number of 100.

$$30 \% = \frac{30}{100}$$

So, to find 30 % of an amount you must work out $\frac{30}{100}$ of that amount.

Example: 30 % of 90 mm = $30 \div 100 \times 90 = 27$ mm

Multiplying and dividing using standard form

When you multiply numbers in standard form, you **add** the powers of 10, like this:

$$10^3 \times 10^5 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 10^8$$

Example: 2.3×10^5 multiplied by one thousand = $2.3 \times 10^5 \times 10^3 = 2.3 \times 10^{5+3} = \underline{2.3 \times 10^8}$

Where both numbers are in standard form, you multiply the numbers and add the powers of 10, like this:

$$2 \times 10^{-3} \times 3.4 \times 10^6$$

Multiply the numbers $2 \times 3.4 = 6.8$

Add the powers of 10 $10^{-3} \times 10^6 = 10^{-3+6} = 10^3$

Put it together 6.8×10^3

When you divide numbers in standard form, you **subtract** the powers of 10, like this:

$$10^5 \div 10^3 = \frac{10 \times 10 \times 10 \times 10 \times 10}{10 \times 10 \times 10} = 10^2$$

★ Use the $\times 10^x$ or x^n button on your calculator for complicated calculations.

WORKED EXAMPLE

Since the start of the COVID-19 pandemic, the cases of infection in the UK are estimated to be 2.3×10^7 . The number of deaths is estimated as 1.82×10^5 .

Calculate the death rate as a percentage of total infections.

Solution

The calculation you do is $\frac{\text{deaths}}{\text{cases of infection}} \times 100$

On your calculator that's $1.82 \times 10^5 \div 2.3 \times 10^7 \times 100 = 0.79\%$ to 2 dp.

Fractions, ratios and percentages

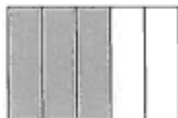
Fractions

A **fraction** is made up of two parts: the **numerator** (on the top) and the **denominator** (on the bottom).

★ The **denominator** tells you how many parts or **fractions** the whole amount has been divided into.

★ The **numerator** tells you how many of those fractions we're talking about right now.

Example



This rectangle has been divided into five parts. The parts are **fifths** $\frac{1}{5}$

Three parts out of five are shaded in; that's $\frac{3}{5}$

Two parts out of five are not shaded; that's $\frac{2}{5}$

Finding a fraction of a number or an amount

The rule is that whenever you see the word 'of' in maths, it means that you multiply.

Example: What is $\frac{3}{8}$ of 24?

$$\frac{3}{8} \times 24 = \frac{3 \times 24}{8} = \frac{72}{8} = 9$$

On your calculator that's $3 \div 8 \times 24 = 9$

Multiplying fractions

Rule: When you multiply fractions you just multiply the numerators and multiply the denominators, and then simplify the fraction if you need to.

WORKED EXAMPLE

Calculate $\frac{3}{4} \times \frac{2}{5}$

Solution

$$\frac{3}{4} \times \frac{2}{5} = \frac{3 \times 2}{4 \times 5} = \frac{6}{20} = \frac{3}{10}$$



Ratios

A ratio is a way to compare two or more amounts.

Recipes, for example, are sometimes given as ratios. To make pastry you usually need to mix two parts flour to one part butter. This means that the **ratio of flour to butter is 2 : 1**.

If pastry is two parts flour to one part butter, then there are three parts (2 + 1) altogether. **Two thirds** of the pastry is flour; **one third** is butter.



- ★ Ratios are similar to fractions; they can both be simplified by cancelling down.
- ★ Always write the ratio in the order that is stated in the question. The ratio of flour to butter is 2 : 1; the ratio of butter to flour is 1 : 2.

Example: There are 15 women and six men working in a health centre. What is the ratio of women to men? Give your answer in its simplest form.

The ratio of women to men is 15 : 6. However, both sides of this ratio will divide by 3. Dividing by 3 gives you 5 : 2.

So, the **simplest form** of the ratio is 5 : 2.

Remember, in mathematics **n** means any number

You may be asked to simplify the ratio to **n : 1**. In that case, just divide each side by 2, which gives you 2.5 : 1.

There are two and a half times as many women as men.

WORKED EXAMPLE

Three years ago Adam weighed 50 kg; now he weighs 65 kg. What is the percentage increase in Adam's weight?

Solution

1. Work out the actual increase in his weight by subtracting the two amounts. $65 - 50 = 15$
2. Divide by the original weight, which is 50 kg, and then multiply by 100 to make a percentage.
 $15 \div 50 \times 100 = 30\%$ So, Adam's weight has increased by 30%

Estimating the results of simple calculations

You don't always need an exact value for a number, especially a very long number. Sometimes you can use a rough or an **approximate** value which gives you a good idea what the true value is.

For example, if you are reporting back on an experiment to investigate whether changing the colour of the light affects how quickly a plant makes food by photosynthesis, saying

The rate of photosynthesis of a plant under blue light is almost double the rate of photosynthesis in the same plant under yellow light.

might be more relevant than saying

Under blue light the rate of photosynthesis is 33.7 units, whereas under yellow light the rate of photosynthesis is 16.8 units.

If you are asked to **estimate** an answer, they want a sensible idea of how big the number is, not a calculation using your calculator.

You round off all the numbers in the problem to **one significant figure** to make 'easier' numbers – you can usually do this in your head.

Example: Give an approximate answer to the calculation $\frac{608 \times 29}{5.8}$

Round each number to one significant figure, and then do the calculation:

$$\frac{600 \times 30}{6} = \frac{18\,000}{6} = 3000, \text{ so the answer is } \underline{3000}$$

PRACTICE QUESTIONS

1. a) Copy and complete the table; the first one has been done for you.

Amount in words	Amount in figures
Thirteen thousand five hundred and six	13 506
Two thousand and sixty four	
One million seven hundred and fifty thousand	
	3007
	25 360

4 marks

- b) Arrange the numbers from part a) in order of size, starting with the **smallest**. 1 mark
2. Put these decimal numbers in order of size, starting with the **largest**. 1 mark

0.702, 0.072, 0.72, 0.207, 0.27, 0.027

3. Write these numbers in standard form. 4 marks
 a) Three billion b) 250 000 000 c) 0.0015 d) 0.00000002
4. Complete these statements using powers of 10. 4 marks
 a) A kilogram is _____ grams. b) A millimetre is _____ metres.
 c) A nanosecond is _____ seconds. d) There are _____ μm in a metre.
5. Calculate, giving your answer in standard form: 2 marks
 a) 3.6×10^4 multiplied by one million
 b) 8.7×10^7 divided by 10^2
6. Bacterium species X divides every 1.5 hours. Starting with one bacterium, how many bacteria will there be in 36 hours? 1 mark
7. Simplify the following ratios to $n : 1$. 4 marks
 a) 240 : 60 b) 1 metre : 10 centimetres c) 7000 : 350 d) 18 : 4
8. The ratio of cats to dogs in a rescue centre is 3 : 1. If there are 60 of these animals altogether, how many are dogs? 1 mark
9. Calculate: 2 marks
 a) $\frac{2}{5}$ of 600 b) $\frac{5}{9}$ of 450
10. Multiply these fractions, giving your answer in its simplest terms. 2 marks
 a) $\frac{3}{7} \times \frac{2}{5}$ b) $\frac{2}{5} \times \frac{10}{12}$
11. Three fifths of the trees in a wood are deciduous (lose their leaves in winter). If 45 trees are deciduous, what is the total number of trees in the wood? 2 marks
12. Copy and complete the table below. The first one has been done for you. 5 marks

Fraction	Decimal	Percentage
$\frac{1}{4}$	0.25	25 %
$\frac{3}{8}$		
$\frac{2}{5}$		30 %
		80 %
	0.04	

13. In a school there are 800 students and 70 teachers. 15 % of the students and 20 % of the teachers are left-handed. How many left-handed people are there altogether? 2 marks
14. Anika is on a diet to lose weight. At the start of the diet, she weighed 85 kg. After six months she weighs 70 kg. Calculate the percentage change in Anika's weight. Give your answer to two decimal places. 2 marks
15. Estimate the answer to the following calculation. Your estimate should be a single whole number. 1 mark
- $$\begin{array}{r} 31\ 009 \\ - 1926 \\ \hline \end{array} \quad - \quad \begin{array}{r} 1155 \\ - 201 \\ \hline \end{array}$$