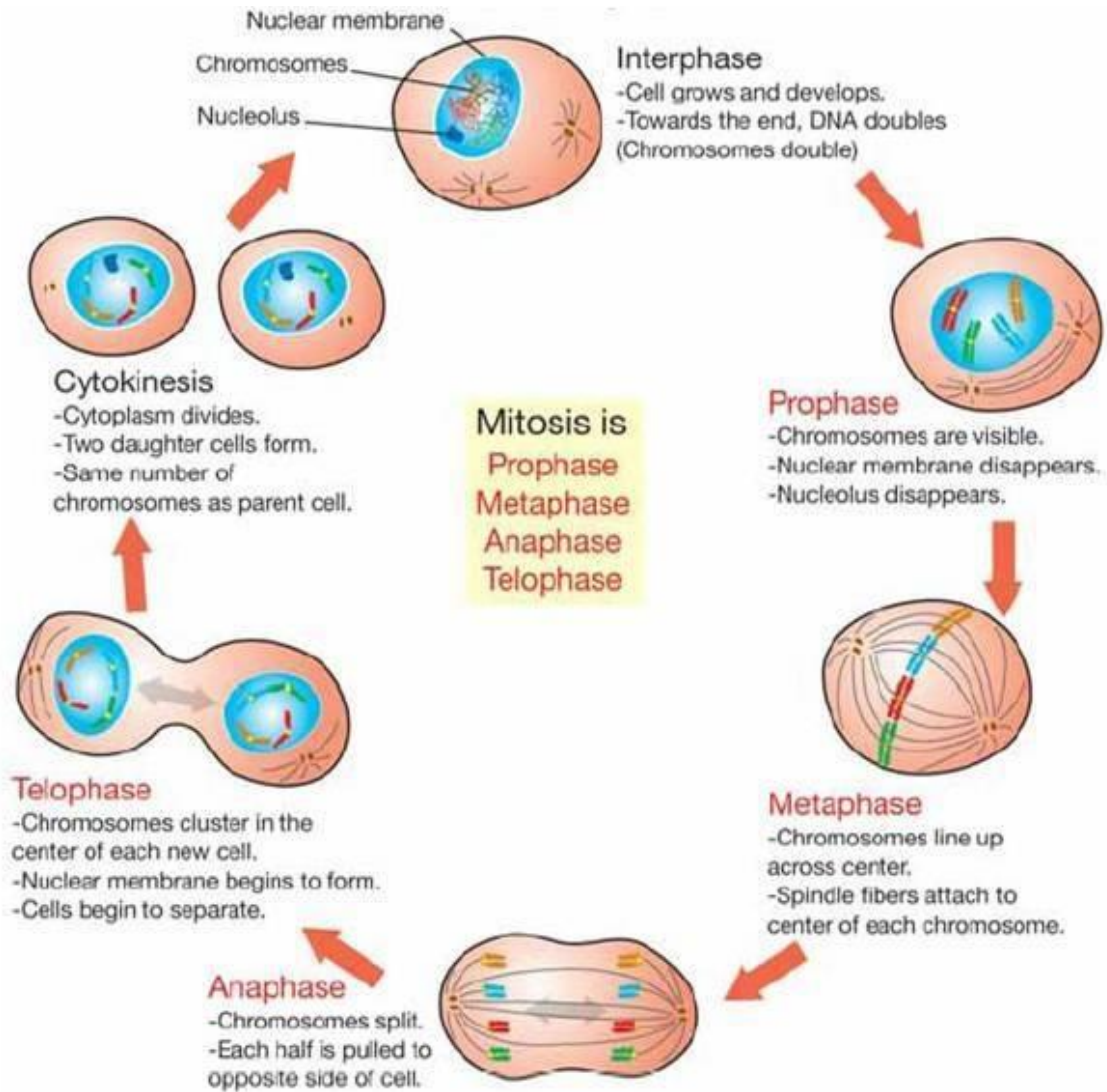

Mitosis HW booklet

Name: _____



Task 1: complete The STAGES OF MITOSIS

Mitosis is the division of the nucleus and is a highly ordered sequence of events which is divided up into stages that are recognisable in **stained** tissue sections with a light microscope

Diagram of Cell	Key Cellular Events
Late Interphase	
Prophase	
Metaphase	

Diagram of Cell	Key Cellular Events
Anaphase	
Telophase	
Cytokinesis	

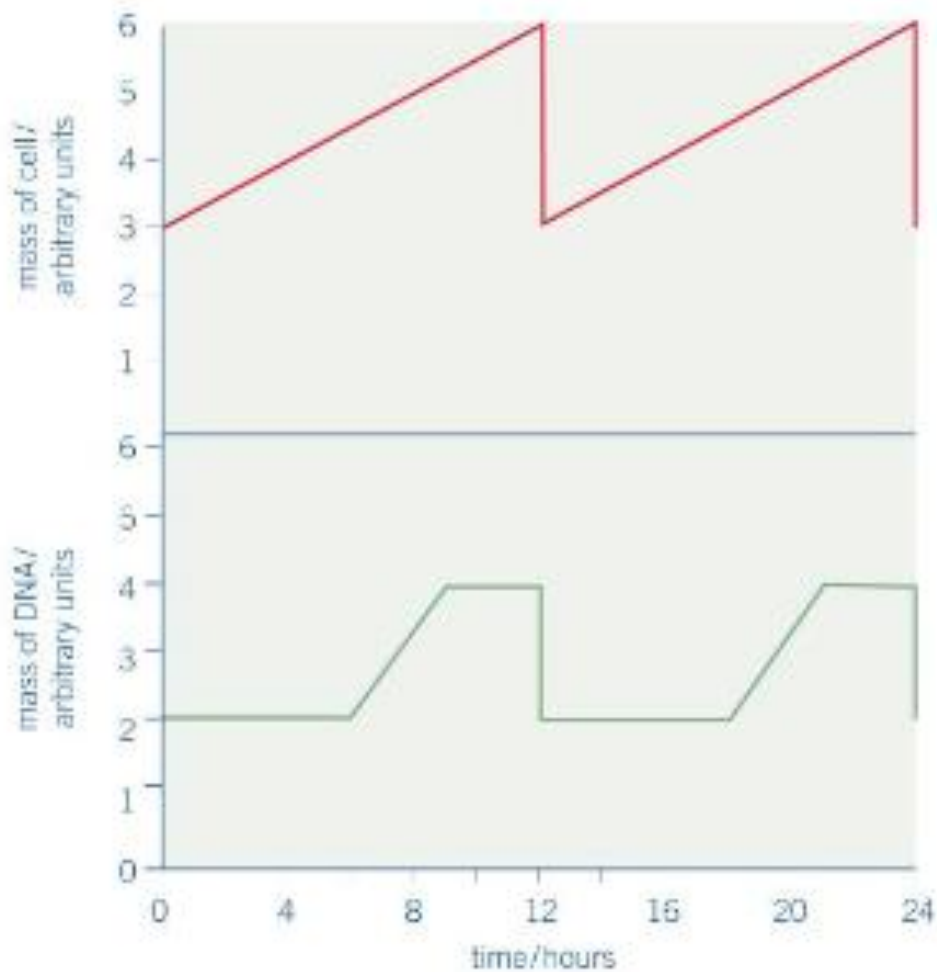
Summary question

- 1 In the following passage about mitosis, state the most appropriate word that is represented by each of the letters.

The period when a cell is not dividing is called **a**. The stage of mitosis when the chromosomes are first visible as distinct structures is called **b**.

During this stage thin threads develop that span the cell from end to end and together form a structure called the **c**. Towards the end of this stage, the **d** breaks down and the **e** disappears. The stage when the chromosomes arrange themselves across the centre of the cell is called **f**. During the stage called **g** the chromatids move to opposite ends of the cell.

Task 3: complete



▲ **Figure 2** Variation in the mass of a diploid cell and the DNA within it during the cell cycle

Summary questions

- 1 List the three main stages of the cell cycle.
- 2 Using Figure 2, state at what time(s), or during which period, each of the following occur:
 - a cell division
 - b replication of DNA.

Task 4: Complete

Introduction

When mitosis is actively occurring in a tissue, such as root tip meristems, it is possible to make stained squashes to see the mitotic stages in individual cells. You may do this as a practical using onion root tips. The mitotic index (MI) is a proportion which is simple to find using the formula:

$$MI = \frac{\text{number of cells with condensed chromosomes}}{\text{total number of cells}} \times 100$$

This will give you a percentage value.

Note that if the multiplication by 100 is not used, the index will be expressed as a simple decimal, e.g. 24% would be expressed as 0.24.

Worked example

Question

In a stained sample of dividing cells, 29 cells were visible in one microscope field of view. Three of these cells had clearly visible chromosomes. What is the MI of the tissue?

Answer

Step 1

Substitute the counted numbers into the formula:

$$MI = \frac{3}{29} \times 100$$

Step 2

Complete the calculation to find the MI:

$$(3 \div 29) \times 100 = 10\%$$

Questions

1 Calculate MI values for the following:

(4 marks)

Tissue sample	Number of cells with visible chromosomes	Total number of cells
a	5	30
b	18	26
c	56	245
d	21	145

2 Calculate the MI of the tissue shown in the photograph on the support sheet.

(2 marks)

3 Mast Cell Tumours occur in dogs, often causing visible swellings on the skin. The MI of samples taken from these tumours is helpful in predicting likely survival times.

MI (%)	Predicted survival times (months)
0–4	>70
0–48	<2

Biopsy tissue samples taken from tumours on two dogs were examined and microscope cell counts were as follows:

Dog	Biopsy sample	Total number of cells counted	Total number of cells in mitotic stages
Boxer	1	492	369
	2	387	173
	3	426	245
Labrador	1	478	25
	2	429	22
	3	351	11

a Calculate the MI for each sample.

(6 marks)

b Calculate the mean MI for each dog. Show your working.

(2 marks)

c Suggest a survival time for the boxer.

(1 mark)

d Comment on the likely survival of the labrador.

(2 marks)