Cell Division

Total mark – 16

Question: 1

Q2.

This question is about cell division.

(a) Which process makes two identical new body cells for growth and repair?

Tick (✓) **one** box.

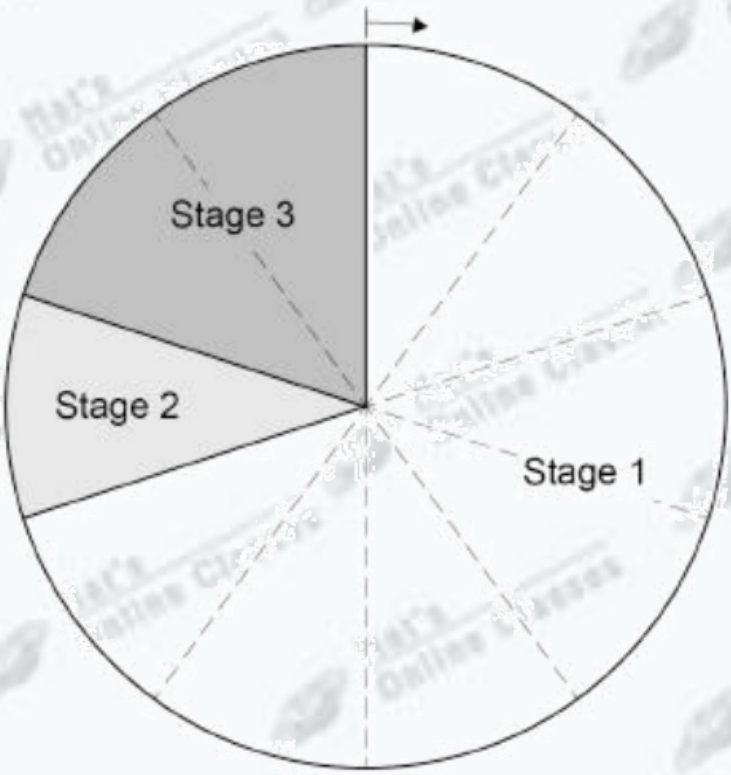
Differentiation ☐

Fertilisation ☐

Mitosis ☐

(1)

The chart shows the three stages of a cell cycle.



(b) Draw **one** line from each stage of the cell cycle to what happens during that stage.

Stage of cell cycle	**What happens during that stage**
Stage 1	One set of chromosomes is pulled to each end of the cell
Stage 2	The cytoplasm and cell membrane divide to form two new cells
Stage 3	The cell grows and the chromosomes replicate

(2)

(c) What percentage of the total time for the cell cycle is taken by stage 1?

_____

_____

_____

Percentage = _____ %

(2)

(d) A cell divides to form two new cells every 24 hours.

How many days will it take for the original cell to divide into 8 cells?

Tick (✓) **one** box.

1 ☐ 3 ☐ 6 ☐ 8 ☐

(1)

(e) The chromosomes contain the genetic material.

Name the chemical which the genetic material is made from.

_____

(1)

(f) The genetic material is made of many small sections.

Each section codes for a specific protein.

What is one section of genetic material on a chromosome called?

Tick (✓) **one** box.

A gamete ☐

A gene ☐

A nucleus ☐

(1)

(g) Stem cells are cells which have **not** yet been specialised to carry out a particular job.

Bone marrow cells are one example of stem cells.

Explain how a transplant of bone marrow cells can help to treat medical conditions.

_____

_____

_____

_____

(2)

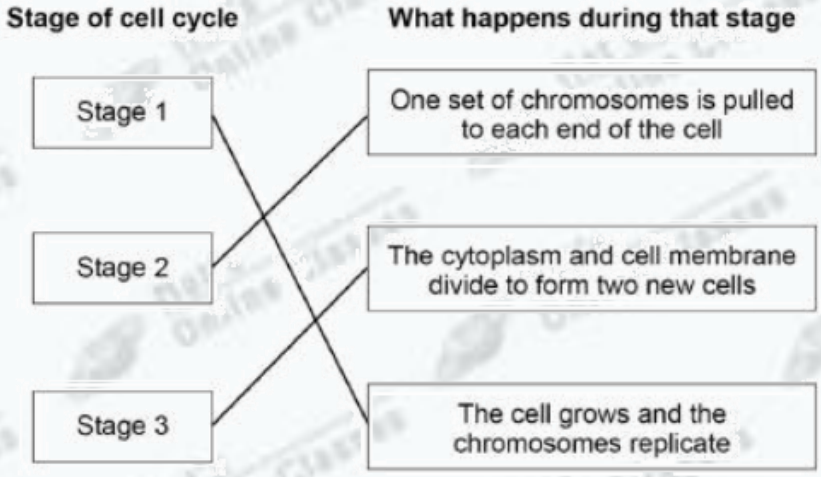
(Total 10 marks)

Q2.

(a) mitosis

1

(b) all lines correct = **2** marks
1 or 2 lines correct = **1** mark



additional line from a box on the left negates the credit for that box

2

(c) $\frac{7}{10} \times 100$

allow $\frac{252}{300} \times 100$

1

70(%)

allow answer calculated from angle in range 250° to 254°

if no other mark awarded, allow 0.7 for ***1***

1

(d) 3

1

(e) DNA

allow deoxyribonucleic acid for 1

1

(f) a gene

1

(g) (bone marrow) cells differentiate into many / other types of (named) cell

allow (bone marrow) cells can become many / other types of (named) cell

1

(so) will cure diseases where new cells are needed
or will cure diseases where cells are damaged

allow (so) will cure anaemia / leukaemia
***or** blood cancer **or** blood disorders*
allow (so) will cure paralysis / diabetes

1

[10]

Question: 2

Q4.

There are two types of cell division: mitosis and meiosis.

(a) Describe **three** differences between the processes of mitosis and meiosis.

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

(3)

(b) Describe **one** similarity between the processes of mitosis and meiosis.

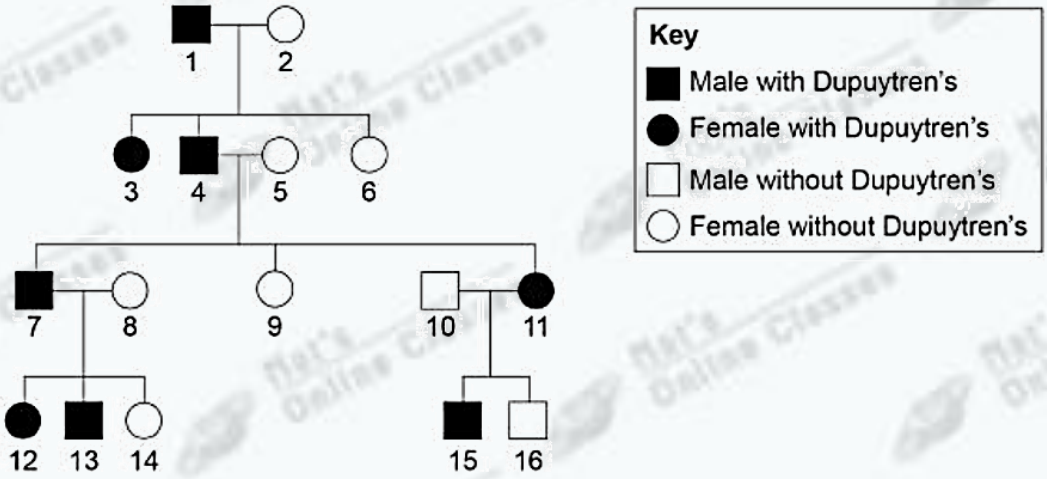
_____

_____

(1)

Dupuytren's is a disorder that affects the hands.

The diagram below shows the inheritance of Dupuytren's in one family.



Dupuytren's is caused by a dominant allele in this family.

D = dominant allele

d = recessive allele

(c) Give the genotype of person **1**.

Explain your answer.

Genotype _____

_____

_____

(2)

Q4.

(a) any **three** from:

- mitosis produces two (daughter) cells but meiosis produces four (daughter) cells

answers must be comparative

- one cell division in mitosis but two cell divisions in meiosis
- mitosis produces cells with two of each chromosome, but meiosis produces cells with one of each chromosome

  allow mitosis produces diploid cells but meiosis produces haploid cells
  *allow mitosis maintains the number of chromosomes **or** mass of DNA **or** mass of genetic material but meiosis halves the number / mass*
  *allow mitosis produces cells with 23 pairs **or** 46 chromosomes but meiosis produces cells with 23 chromosomes*

- mitosis produces genetically identical cells, but meiosis produced genetically different cells

  allow other correct differences between the processes of mitosis and meiosis

3

(b) any **one** from:

- DNA doubles / copies / replicates (once)

  *allow chromosomes **or** genetic material **or** genetic information double / replicate / are copied*

- increase in the number of mitochondria / ribosomes / sub-cellular structures

  ignore mitochondria / ribosomes are copied / duplicated

  allow chromosomes / chromatids pulled to side (of cell)
  allow other correct similarities between the processes of mitosis and meiosis

1

(c) Dd / dD

allow heterozygous

1

has **D** because has Dupuytren's **and** has **d** because child / person 6 is homozygous recessive **or** does not have Dupuytren's **or** is **dd**

*allow has **D** because has Dupuytren's **and** person 1 and person 2 both passed **d** to child / person 6*

*allow has **D** because has Dupuytren's **and** cannot be homozygous / **DD** or all the children would have Dupuytren's*

1