

**YEAR 10 SCIENCE**  
**EXAMINATION - SEMESTER 1, 2017**  
**MULTIPLE-CHOICE - PART A**  
**AND SHORT ANSWERS - PART B**



**KINROSS  
COLLEGE**

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<b>STUDENT NAME:</b>
<b>TEACHER NAME:</b>
<b>DATE:</b>

**USE ATTACHED ANSWER GRID FOR MULTIPLE CHOICE**

**TIME ALLOWED FOR THIS EXAM:**

- Reading time **before** commencing work: 10 minutes
- Working time for this paper: 1 hour 50 minutes

**MATERIAL REQUIRED / RECOMMENDED FOR THIS PAPER:**

*To be provided by the supervisor:*

- This question and answer booklet

*To be provided by the candidate:*

- Pens, pencils, eraser and ruler
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**IMPORTANT NOTE TO CANDIDATES:**

**No other items may be taken into the examination room.**

It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **BEFORE** reading any further. All iPads and mobile phones must be turned off and in your bag along with any other devices and notes. Bags are to be closed and placed under the desk.

**INSTRUCTION TO CANDIDATES:**

1. **Read** through the paper, Part A and Part B, to familiarise yourself with all the questions.
2. Use a **blue or black** ballpoint / ink pen for written answers. Use pencil for drawing the graph.
3. **Write** your answers in the booklets.
4. Should you require more space than you have been given please use **the spare sheet** (at the back of this booklet) and ensure that you include your name and the question / statement to which you are responding.

**AT THE END OF THE EXAMINATION:**

- Any planning sheets or other pieces of paper **MUST** be handed in with this booklet.
- At the end of the examination make sure that your name is on your booklet and any other pieces of paper used.

**SECTION A: MULTIPLE-CHOICE (1 mark each)**

**CHOOSE AND CIRCLE THE LETTER WHICH BEST FITS THE STATEMENT OR QUESTION.**

**1. The DNA molecule:**

- a) Is a long thread-like structure that looks like a twisted ladder.
- b) Contains bases arranged in complementary pairs.
- c) Is referred to as a double helix.
- d) All of the above are correct.

**2. A typical human cell contains:**

- a) One sex chromosome only
- b) 46 pairs of chromosomes.
- c) 23 individual chromosomes.
- d) 23 pairs of chromosomes.

**3. A gamete produced by meiosis has:**

- a) The same number of chromosomes as the parent cell.
- b) Twice the number of chromosomes as the parent cell.
- c) Half the number of chromosomes as the parent cell.
- d) No chromosomes at all.

**4. DNA is made up of building blocks called nucleotides. Each nucleotide contains:**

- a) A phosphate and a base
- b) A sugar and a base
- c) A phosphate, sugar and a base
- d) A nitrogen, sugar and a base

**5. Gametes are:**

- a) normal cells like muscle and brain cells
- b) sex cells, sperm or eggs (ova)
- c) another name for chromosomes
- d) part of a strand of DNA.

**6. Which of the following is true for *both* mitosis and meiosis?**

- a) occurs in all body cells
- b) involves cell replication
- c) produces cells with the same number of chromosomes as the parent cell
- d) produces four daughter cells per division

**7. When lions prey on a herd of antelope, some antelope are eliminated. Which part of Darwin's theory of evolution may be used to describe this situation?**

- a. acquired characteristics
- b. convergent evolution
- c. survival of the fittest
- d. speciation due to mutations

**8. Charles Darwin and Alfred Russell Wallace were the first to:**

- a. explain the source of the natural variation occurring within a species
- b. challenge the ideas of biodiversity
- c. propose the idea of natural selection to explain how organisms evolve
- d. suggest that characteristics acquired during a lifetime could be passed on to offspring.

**9. Which type of evolution best explains the observation that the South American anteater and the African armadillo have several similarities but are not genetically closely related?**

- a. divergent evolution
- b. convergent evolution
- c. parallel evolution
- d. punctuated equilibrium.

**10. The evolution of a species by natural selection would be expected to occur fastest in organisms that:**

- a. live in a stable environment and reproduce rapidly
- b. live in a stable environment and reproduce slowly
- c. live in a changing environment and reproduce rapidly
- d. live in a changing environment and reproduce slowly.

**PHYSICS MULTIPLE-CHOICE QUESTIONS:**

**11. The terms speed and velocity are used to describe objects which are moving. They:**

- a. mean exactly the same thing and are measured with the same units.
- b. are similar terms, measured with the same units, but are not exactly the same.
- c. both involve measurements of distance, time and direction.
- d. are used in different situations, with velocity being used only when the values are very large.

**12. A car is slowing down on a level road. There must be:**

- a. no force acting on it
- b. a large upwards force acting on it
- c. a small backward force acting on it
- d. a small positive acceleration acting on it

**13. Inertia can be defined as:**

- a. the amount of matter in an object
- b. a tendency of an object to resist a change in its motion
- c. the force of gravity on an object
- d. when a force makes something move

**14. When we use the term 'a force' we mean:**

- a. something that always causes something else to move.
- b. an occurrence that always causes major damage.
- c. simply a 'push' or a 'pull' on something.
- d. a 'push' being applied to an object which moves as a result.

15. Which one of the following statements about friction is INCORRECT?

- a. Friction operates in the same direction as a moving object.
- b. Friction is a contact force.
- c. Friction between two moving objects produces heat.
- d. Without friction you could not grip an object or walk.

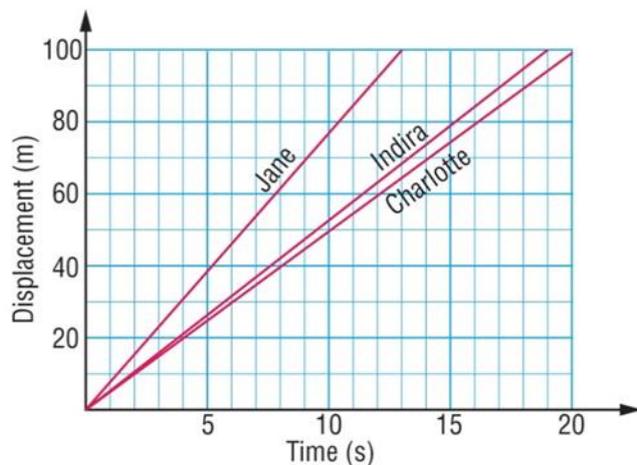
16. Which of the following is best explained by Newton's third law?

- a. Unbelted passengers will be thrown forward when a car stops suddenly.
- b. A gun recoils when a shot is fired.
- c. The acceleration of an object when a force is applied depends on the mass of the object.
- d. The weight of an object varies from planet to planet.

17. Which of the following best describes the energy changes occurring when an apple falls from a tree branch to the ground below?

- a. gravitational potential  $\rightarrow$  kinetic  $\rightarrow$  heat and sound
- b. elastic potential  $\rightarrow$  kinetic  $\rightarrow$  heat and sound
- c. gravitational potential  $\rightarrow$  heat  $\rightarrow$  kinetic
- d. elastic potential  $\rightarrow$  heat  $\rightarrow$  kinetic

18. Three students, Jane, Indira and Charlotte run in a 100m sprint on a school sports day. The displacement (or distance) / time graph of their motion is shown below:



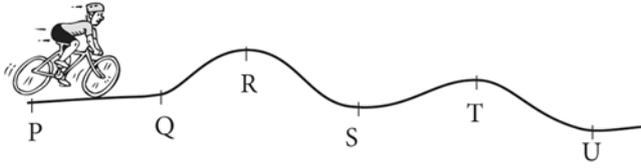
Select the alternative below that correctly orders their finish places in the race.

- a. Jane wins, Indira is second and Charlotte is third.
- b. Indira wins, Jane is second and Charlotte is third.
- c. Charlotte wins, Indira is second and Jane is third.
- d. Charlotte wins, Jane is second and Indira is third.

19. "All bodies remain in a state of rest or uniform motion unless acted upon by an external unbalanced force." This property of bodies is called:

- a. mass
- b. inertia
- c. density
- d. weight

20. A cyclist rides a hilly course between points P and U, as shown in the diagram:



The most likely regions where he would accelerate are between points:

- a. (i) R and S, and (ii) T and U.
- b. (i) R and S, and (ii) S and T.
- c. (i) P and Q, and (ii) T and U.
- d. (i) S and T, and (ii) T and U.

Name: \_\_\_\_\_

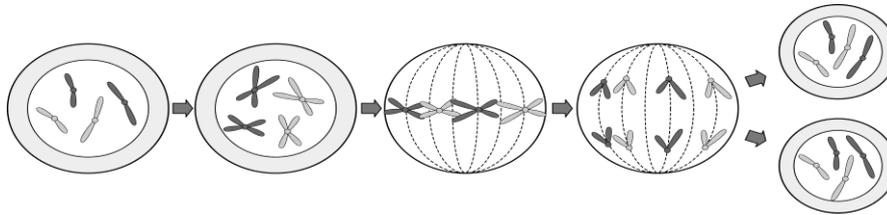
## Yr 7 Science Exam Multiple Choice Answer Sheet

Circle the letter indicating the *best* answer.

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D

## SHORT ANSWERS – PART B

The diagrams below shows the stages occurring during a cell division.



Is the cell division shown mitosis or meiosis?

a. Justify your answer for part a

b. Identify one type of cell that might undergo the type of cell division shown above.

(3 marks)

1. Complete the table to compare the two cell divisions

	Mitosis	Meiosis
Types of cells produced		
Haploid/diploid		
Number of daughter cells		

(3 marks)

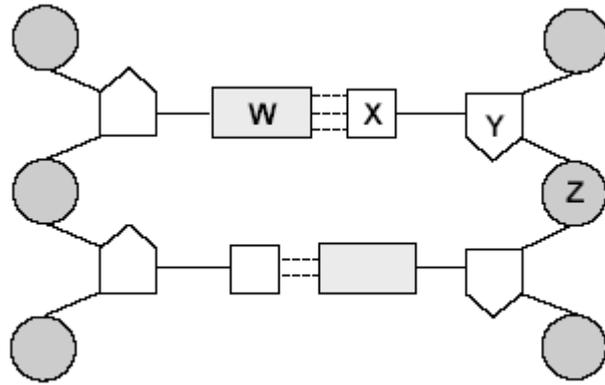
2. Match the definition with the following terms

Base pairing rule
Zygote
Gamete
Somatic cell
clone
gene
genome
homologous

Genetically identical copy
The complete set of genes present in an organism or somatic cell
Used to describe members of each matching pair of chromosomes
The concept that in DNA every A pairs with T and every C pairs with G
Segment of DNA molecule that codes for a particular trait.
Formed by the fusion of a sperm and egg
Cells of the body that are not sex cells
Reproductive or sex cells

(8 marks)

3. The diagram below is of a small strand of DNA.



a) (i) Name Y: \_\_\_\_\_

(1 mark)

(ii) Name Z: \_\_\_\_\_

(1 mark)

b) If W was guanine, then X would be

\_\_\_\_\_

(1 mark)

c) A single strand of DNA is shown below. Complete the table below to show the complementary bases.

<b>DNA Strand A</b>	<b>A</b>	<b>G</b>	<b>T</b>	<b>A</b>	<b>C</b>	<b>C</b>	<b>A</b>	<b>T</b>	<b>G</b>
<b>DNA Strand B</b>									

(3 marks)

4. Suppose that a particular breed of dog can be grey or white in colour. The gene for grey colour (G) is dominant over the gene for white colour (g).

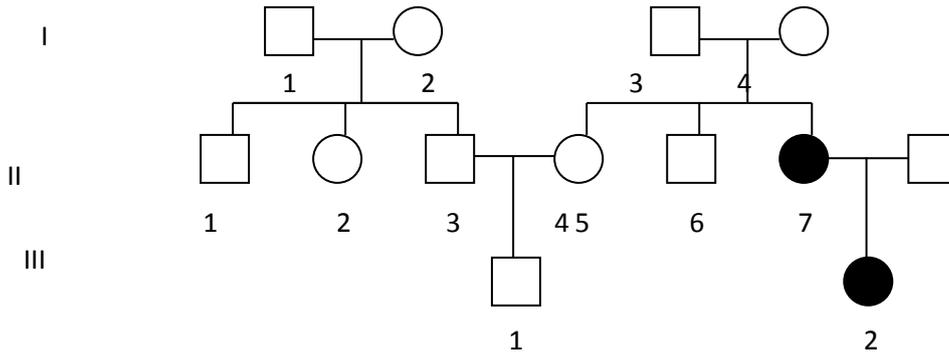
a) If a homozygous grey dog and a homozygous white dog were to breed, what are the possible genotypes and phenotypes of their pups? (2 marks)

b) If two from the litter were to mate, what are the chances of producing a white pup?

Use a punnet square to explain your answer.

(2 marks)

5. Individuals who lack an enzyme needed to form the skin pigment melanin are called albinos. Normal skin pigmentation (A) is dominant to albinism (a).



- Which individuals are affected by albinism? \_\_\_\_\_ (1mark)
- How many males are not affected by albinism? \_\_\_\_\_ (1mark)
- What is the genotype of those affected? \_\_\_\_\_ (1 mark)
- What is the genotype of individual I-3? \_\_\_\_\_ (1mark)
- How many children do couple I-1 and I-2 have? \_\_\_\_\_ (1mark)
- Show, using a punnet square how couple II-6 and II-7 have an albino child. (5 marks)

6. Describe a genetic disorder that you have studied: include the cause, major symptoms and treatments \_\_\_\_\_

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(5 marks).

# ENERGY AND MOTION

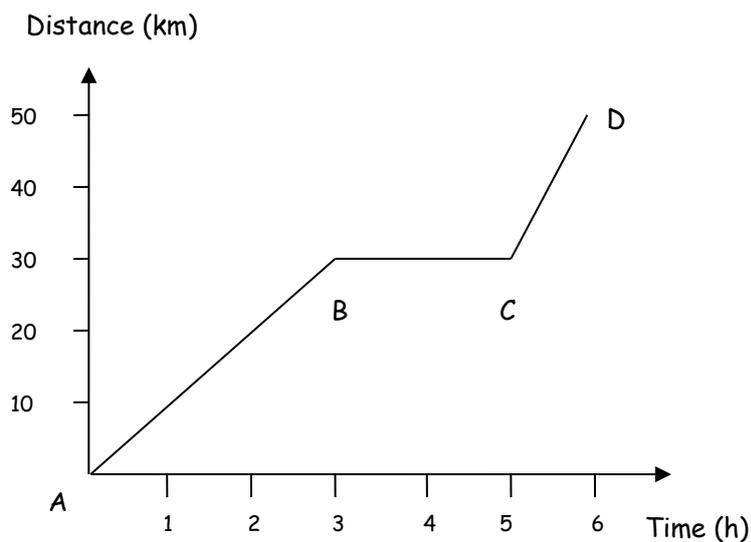
1. Scalar quantities only have a magnitude (size), while vector quantities have a magnitude and a direction. Place the following quantities into the correct column in the table:

Mass; speed; velocity; displacement; weight; distance

Scalar quantity	Vector quantity

(3 marks)

2. Ben and Jordan went out cycling one day. The graph below shows how far they travelled during the ride.



- a. How far did they travel in total? (1 mark)
- b. For how long were they cycling before they stopped? (1 mark)
- c. Between which two points did they travel fastest? (1 mark)
- d. How can you tell this from the graph? (1 mark)
- e. For how long did they stop for lunch? (1 Mark)

For the next question, you need to use the Motion Equations from the formula sheet (Attached)

3a. A car travels 100km in 2 hours. What is its velocity?

(4 marks)

3b. If a motorbike is traveling at 25m/s and accelerates at 5m/s<sup>2</sup> for 3s, what is its final velocity?

(4 Marks)

3c. Terry is fixing a broken tile on his roof when he falls off. If it takes him 1s to hit the ground, how high was his roof?

(4 Marks)

The following question is also based on the motion equations. However, to work out the answer you will need to use 2 of the equations. Your answer to the first equation is required in the second equation.

Show all your workings. You will be awarded:

- 1 mark for identifying the information you've been given,
- 2 marks for picking the correct equation,
- 2 marks for getting the right answer; and
- 2 marks for giving the correct unit.

4. A train accelerates from 20m/s to 40m/s in 10s. How far did it travel during this acceleration?

(7 marks)

For this question you will need to use the Force and Work equations from the formula sheet.

5. A force of 20 N acts on a 5 kg block which is at rest on a frictionless table. The block travels 2 metres while the force acts.

a. What is the acceleration of the block?

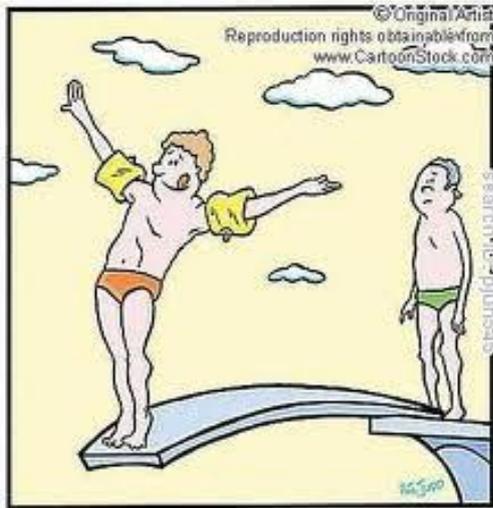
(4 marks)

b. How much work is done on the block?

(4 marks)

6. For this question you will need to use the Energy equations from the formula sheet (Attached).

Kim weighs 75kg. He dives from a 10m diving board:



- a. How much gravitational potential energy does he have when he is standing on the board waiting to dive?  
(3 Marks)
- b. When he has fallen 1 metre down from the board:
- (i) How much gravitational potential energy does he have now?  
(3 Marks)
- (ii) How much kinetic energy does he have?  
(3 marks)
- (iii) What is his velocity at this point?  
(4 marks)

## YEAR 10 PHYSICS FORMULA SHEET

### Motion Equations

$$v=s/t$$

$$s=vt$$

$$t=s/v$$

$$a=(v-u)/t$$

$$v=u+at$$

$$t=(v-u)/a$$

$$s=(ut)+(0.5at^2)$$

$$\text{when } u=0: t = \sqrt{\frac{2s}{a}}$$

$$a=2s/t^2$$

Where:

v = final velocity    s = displacement    t = time a = acceleration

u = initial velocity

if something is falling, then acceleration =  $9.8 \text{ m/s}^2$

### Force and Energy Equations

$$F = m \times a$$

$$a = F/m$$

$$m = F/a$$

Where: F = force    m = mass    a = acceleration

Work done = Force x displacement

Energy cannot be created or destroyed, only changed from one form to another

Gravitational potential energy = mass x gravity x height

(where gravity =  $9.8 \text{ m/s}^2$ )

Kinetic energy =  $\frac{1}{2}$  x mass x velocity x velocity

$$\text{Velocity} = \sqrt{\frac{2 \times KE}{\text{mass}}}$$

### How to answer calculation questions

Show all your working. You will be awarded:

- 1 mark for identifying the information you've been given,
- 1 mark for picking the correct equation,
- 1 mark for getting the right answer and
- 1 mark for giving the correct unit.

Spare sheet:

**END OF EXAMINATION**