ALEXANDER ROAD HIGH SCHOOL

SEPTEMBER 2021 **PHYSICAL SCIENCES CONTROL TEST** 50 MINUTES

JA **GRADE 10 (blue)** TOTAL = 40

Instructions:

- The question paper consists of 5 questions.
- Answer all the questions.
- Answer section A on the answer sheet provided AND section B on folio sheets.
- A non-programmable calculator may be used.
- Number the answers correctly according to the numbering system.
- Round off to two (2) decimal places where necessary.

SECTION A

(answer on the answer sheet)

QUESTION 1:

Four possible options are provided as answers to the following questions. Each question has only one correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.4) on the answer sheet.

1.1 Which ONE of the following quantities is a SCALAR?

A. Force
B. Time
C. Weight
D. Acceleration

1.2 The speed limit inside a city in South Africa is 60 $km.h^{-1}$. In $m.s^{-1}$ this speed is

A. 0,0167
B. 1,67
C. 16,67
D. 216

1.3 A car accelerates at 8 $m.s^{-2}$ to the right for 20 s. Which ONE of the following statements is FALSE?

A. The car is moving at a constant velocity for 20 s.

B. The car is moving at a constant acceleration for 20 s.

C. The car's speed is changing by 8 $m.s^{-1}$ every second for 20 s.

D. The car could be speeding up or slowing down.

1.4 A satellite orbits Earth at a constant speed of 11 300 $km.h^{-1}$.

Which ONE of the following statements is TRUE?

A. The satellite is accelerating because the direction of motion is changing.

B. The satellite is not accelerating because it is moving at a constant speed.

C. The satellite is not accelerating because it is decelerating (i.e. slowing down).

D. The satellite is not accelerating because it is floating in space.

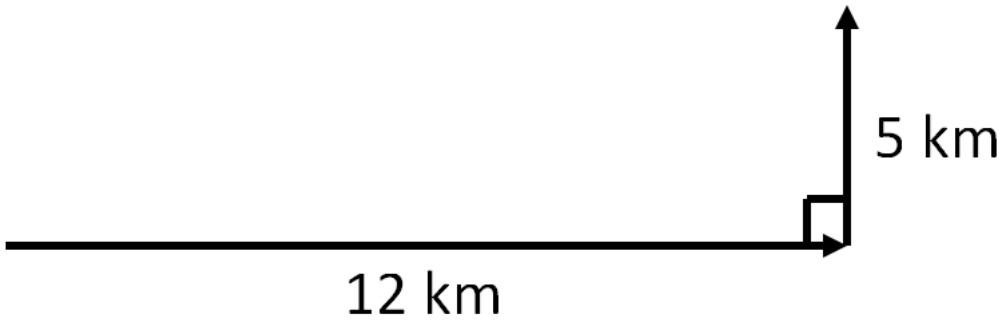
TOTAL SECTION A = [8]

SECTION B

(answer on folio paper)

QUESTION 2:

Lusapho runs 12 km due East and then turns and runs a further 5 km due North. These vectors are represented using arrows drawn tail-to-head as shown in the diagram below.



2.1 Define the term *vector*. (2)

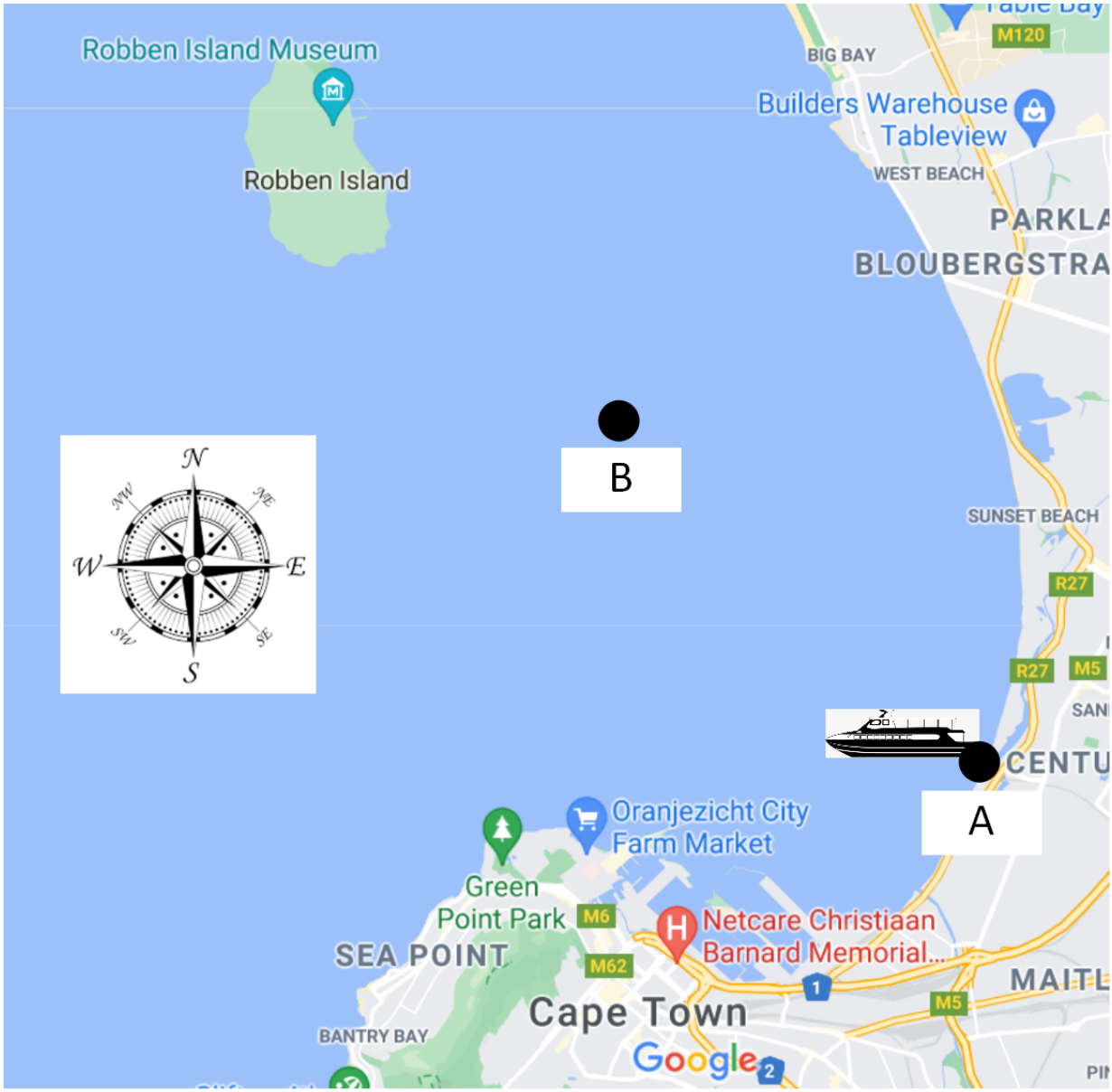
2.2 What is the name of the vectors mentioned above? In other words, give **one term** to describe the phrases “12 km due East” and “5 km due North”. (1)

2.3 **Calculate** the resultant vector. (5)

[8]

QUESTION 3:

A ferry boat full of tourists is travelling from Cape Town to Robben Island as shown in the diagram on the next page. The boat begins at point A. The engine propels the boat due West with a force of 1 500 N. However, the ocean currents push the boat with a force of 800 N due North and the wind also pushes the boat with a force of 500 N bearing 37°.



3.1 Define the term *resultant vector*. (2)

3.2 Find the resultant force acting on the boat **by construction**.
Use a scale of **1 cm : 200 N**. (5)

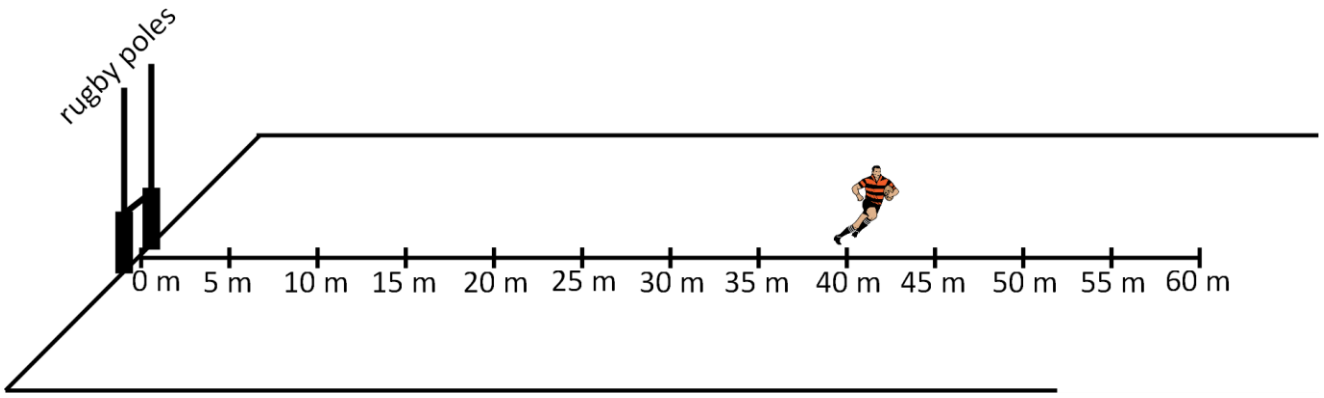
3.3 Based on the answer to question 3.2, will the boat reach Robben Island? (1)

3.4 When the boat is at point B, the captain wishes to stop the boat and look at some whales swimming nearby. He does this by dropping an anchor into the water which exerts an additional force (F_{anchor}) on the boat bringing it to rest. If ALL other forces acting on the boat remain the same write down the required magnitude and direction of F_{anchor}. (2)

[10]

QUESTION 4:

A rugby player is holding the ball 40 m to the right of the rugby poles as shown in the diagram below. He runs 15 m to the right with the ball before getting tackled by an opposition player. The opposition player steals the ball and kicks it 35 m to the left. This entire sequence of events takes place over 25 s.



4.1 Define the term *average velocity*. (2)

4.2 What is the final position of the rugby ball **relative to the rugby poles**? (2)

4.3 Calculate:

4.3.1 The average speed of the ball. (3)

4.3.2 The average velocity of the ball. (3)

[10]

QUESTION 5:

A Formula 1 car crosses the finish line at a velocity of 100 $m.s^{-1}$ to the right. The driver immediately applies the brakes decelerating to a velocity of 22 $m.s^{-1}$ to the right in 3 s.

5.1 Calculate the magnitude of the acceleration of the Formula 1 car. (3)

5.2 What is the direction of the acceleration? (1)

[4]

TOTAL SECTION B = [32]