Physics Modules 1 and 2

Practice exam

Student name: _____

Structure of this paper

Section	Number of questions	Approximate time to allow for answering this section	Marks
I Multiple choice	10	15 minutes	10
II Short answer	9	1 hour and 15 minutes	40
		Total	**50 marks**

Instructions

- Reading time—5 minutes
- Working time—1.5 hours
- Write your name in the space provided above.
- This exam requires a formulae and data sheet. You can access the Physics Stage 6 Syllabus for New South Wales data sheet online, or refer to the Pearson data sheet provided.
- The following items are approved for use in the examinations:
  - Standard items: pens (black preferred) for writing, pencils (at least 2B) for drawing diagrams, highlighter, sharpener, ruler.
  - Special items: one scientific calculator. Check with your teacher which calculators are approved to use in this examination.
- Answer all questions in the spaces provided using black pen.
- Confine your responses to the specific questions asked and follow any instructions that are specific to a particular question.
- Diagrams are not drawn to scale (unless otherwise stated).

Disclaimer

This is a practice examination. It represents Pearson Australia's view only of what would be useful preparation material for the externally assessed examination.

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Section I—Multiple-choice questions

10 questions

10 marks

Allow about 15 minutes for this section.

Instructions for Section I

Answer all questions by circling the correct option.

Choose the response that is correct or that best answers the question.

A correct answer scores 1, an incorrect response scores 0.

Marks will not be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

1 A car accelerates in a straight line at a rate of 5.5 m s^{-2} from rest. What distance has the car travelled at the end of 3 seconds?

A. 49.5 m

B. 41.3 m

C. 16.5 m

D. 24.8 m

2 An aeroplane flies a distance of 500 km due north, then changes course and travels 250 km due east. What is the final displacement of the aeroplane?

A. 750 km north-east

B. 559 km N 26.6° E

C. 559 km N 63.4° E

D. 250 km north-east

3 A driver in Car A travelling at 80 km h^{-1} observes Car B approaching at 110 km h^{-1}. A stationary observer at the roadside would measure the speed of Car B as:

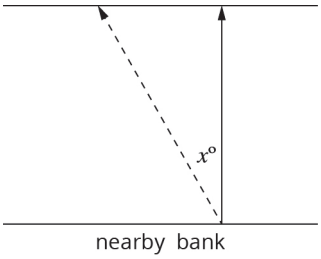
A. 30 km h^{-1}

B. 110 km h^{-1}

C. 190 km h^{-1}

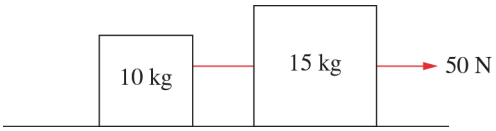
D. 80 km h^{-1}

4 A swimmer swims directly across a river at 0.75 m s^{-1}. The river is flowing east to west at 1.8 m s^{-1}. An observer on the nearside riverbank notices that the swimmer's path across the river has been deviated by an angle of $x°$. What is the value of x?



A. 22.6°
B. 65.4°
C. 67.4°
D. 24.6°

5 A 10 kg and a 15 kg mass are attached by a light inelastic string and are placed on a frictionless surface. A force of 50 N pulls both masses to the right as shown. With what force does the 10 kg mass pull on the 15 kg mass?



A. 5 N
B. 15 N
C. 20 N
D. 40 N

The next two questions relate to the following information.

Travelling at a velocity of 20 m s^{-1}, a motorcycle brakes hard, stopping in 2 seconds.

6 What would be its stopping distance?

A. 10 m
B. 20 m
C. 40 m
D. 5 m

7 What would be the coefficient of friction between the tyre and the road?

A. $\frac{10}{9.8}$

B. $\frac{9.8}{10}$

C. 9.8

D. Cannot be determined as mass is unknown

8 A billiard player lines up his white ball, to strike another ball into the corner pocket. Everyone hears the strike and watches both the white ball and the other ball sink into different pockets.
Which statement correctly identifies what has occurred?

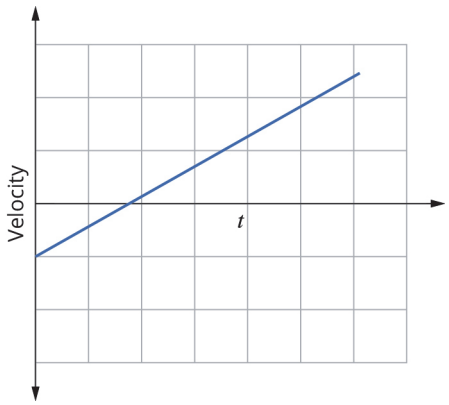
A. Both momentum and kinetic energy have been conserved.

B. Momentum has not been conserved but kinetic energy has been conserved.

C. Momentum has been conserved but kinetic energy has not been conserved.

D. Both momentum and kinetic energy have not been conserved.

9 A car travels along a straight road. Its motion is recorded on a graph up to a certain time, *t*.
Which statement is correct regarding its journey?



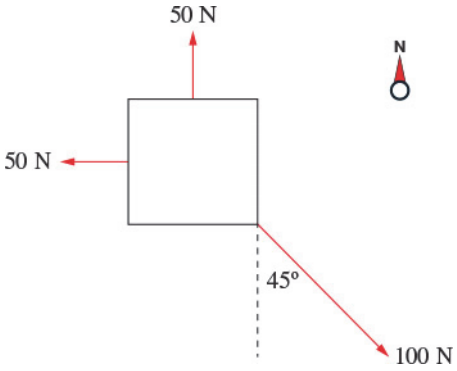
A. The car is always heading the same direction.

B. The car is travelling at a constant velocity, and its final displacement is positive.

C. The car crosses the same point on the road more than once in its journey.

D. The car has a changing acceleration and has a net displacement.

10 A mass is subjected to three forces as shown in the diagram below. What is the net force on the mass?



A. 0 N at 0°

B. 200 N at S 45° W

C. $(100 + 50\sqrt{2})$ N at S 45° W

D. $(100 - 50\sqrt{2})$ N at S 45° W

Section II—Short-answer questions

9 questions

40 marks

Allow about 1 hour and 15 minutes for this section.

Instructions for Section II

Answer the questions in the spaces provided. Use the spaces to guide you on the length of response expected.

Show all relevant working for questions involving calculations.

Extra writing space is provided at the end of this exam. If you use it, clearly indicate which question you are responding to.

Question 11 (2 marks)

What are the horizontal (*x*) and vertical (*y*) components of a force of 50 N on an object that is 30° upwards from the positive *x* direction? (2 marks)

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Question 12 (2 marks)

A student measures the following times (in seconds) for a motion experiment.

3.3, 3.6, 2.8, 2.9, 3.7, 3.0, 3.1, 2.7

If the displacement was 10 m, determine the average velocity and uncertainty for the dataset. (2 marks)

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Question 13 (1 mark)

Graphs are often created when analysing straight-line motion. Why are graphs usually required in data analysis? (1 mark)

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Question 14 (5 marks)

A 200 g toy truck with a springy bumper travelling at 0.300 m s^{-1} collides with a 100 g toy car travelling in the same direction at 0.200 m s^{-1}. The car moves forwards travelling at an increased speed of 0.300 m s^{-1}.

a. Calculate the speed of the truck after the collision. (2 marks)

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b. Is this collision elastic? Justify your response with calculations. (3 marks)

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Question 15 (7 marks)

Sally was driving her car at a constant speed of 10 m s^{-1} along a straight stretch of road. The total mass of the car and driver is 1500 kg. Sally saw a traffic light in front of her change from green to red. It took her 1.5 s to see the light change and make the decision to apply her brakes in order to stop the car.

a. From the moment Sally sees the traffic light turn red, what distance did the car travel before Sally applied the brakes? (2 marks)

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b. Once Sally applied the brakes, it took the car 5.1 seconds to come to a stop. Assuming the deceleration is constant, what was the magnitude of the car's deceleration? (2 marks)

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c. If Sally's car came to a stop next to the traffic light, how far from it had she been when she first saw it change from green to red? (3 marks)

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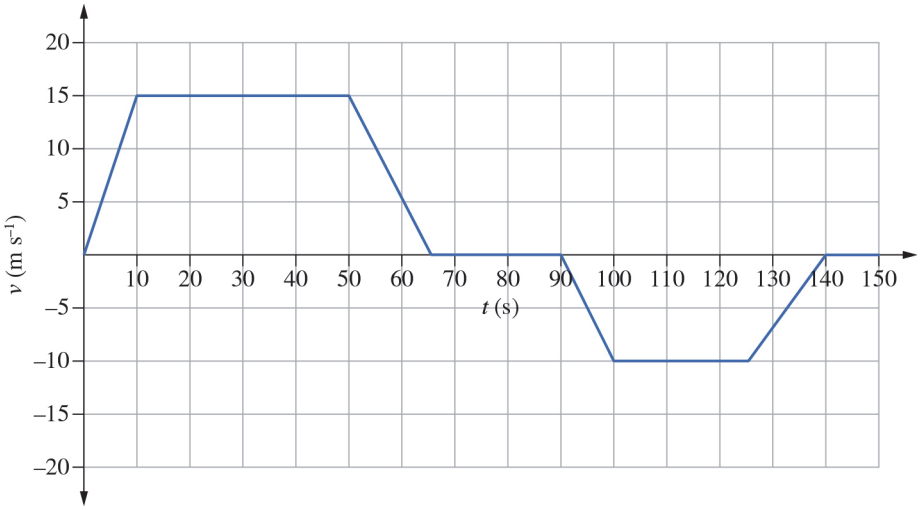
Question 16 (10 marks)

The graph below shows part of a journey taken by a student on a bus. The bus and its passengers have a combined mass of 18 000 kg.



a. What was the bus's acceleration at t = 60 seconds? (2 marks)

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b. What is the net force acting on the bus at t = 60 seconds? What effect does this have on the bus? (2 marks)

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c. If the driving force provided by the bus's motors during the first 10 seconds of the journey was a constant 58.5 kN, what average resistive force acted against the bus during this time? (3 marks)

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d. What was the bus's average velocity for the 150-second journey as shown by the graph? (3 marks)

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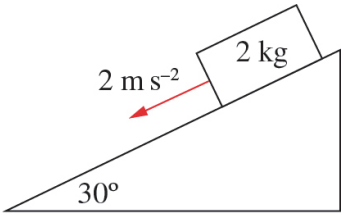
Question 17 (6 marks)

A student places a block onto an incline and records the acceleration down the slope to be 2 m s^{-2}.



a. Label the forces on the block. (3 marks)

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b. Calculate the coefficient of friction for this situation. (3 marks)

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Question 18 (5 marks)

A student drops a rock into a pool. They notice that when it enters the water it suddenly slows down but drops at a constant rate until it hits the bottom. Explain their observations by referring to Newton's laws. (5 marks)

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Question 19 (2 marks)

What power would be required to slide an object with a mass of 500 kg at a constant speed of 30 m s^{-1} across a rough surface with a coefficient of kinetic friction of 0.5? (2 marks)

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Section II—extra writing space

