



## Western Australian Certificate of Education ATAR course examination, 2018

### Question/Answer Booklet

# 11 PHYSICS

## Test 3 - Forces, Work and Energy

Name

Student Number: In figures

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Mark:  $\frac{\quad}{47}$

In words

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### Time allowed for this paper

Reading time before commencing work:

five minutes

Working time for paper:

sixty minutes

### Materials required/recommended for this paper

#### ***To be provided by the supervisor***

This Question/Answer Booklet

Formulae and Data Booklet

#### ***To be provided by the candidate***

Standard items: pens, (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: non-programmable calculators satisfying the conditions set by the School Curriculum and Standards Authority for this course

### 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.

## Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of exam
Section One: Short Answers					
Section Two: Problem-solving	7	7	60	47	100
Section Three: Comprehension					
Total					100

## Instructions to candidates

1. The rules for the conduct of examinations at Holy Cross College are detailed in the College Examination Policy. Sitting this examination implies that you agree to abide by these rules.
2. Write your answers in this Question/Answer Booklet.
3. Working or reasoning should be clearly shown when calculating or estimating answers.
4. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
5. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.
  - Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  - Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.
6. Answers to questions involving calculations should be **evaluated and given in decimal form**. It is suggested that you quote all answers to **three significant figures**, with the exception of questions for which estimates are required. Despite an incorrect final result, credit may be obtained for method and working, providing these are **clearly and legibly set out**.
7. Questions containing the instruction "estimate" may give insufficient numerical data for their solution. Students should provide appropriate figures to enable an approximate solution to be obtained. Give final answers to a maximum of two significant figures and include appropriate units where applicable.
8. Note that when an answer is a vector quantity, it must be given with magnitude and direction.
9. In all calculations, units must be consistent throughout your working.



(b) Determine the impulsive force exerted by the wall onto the ball. [3 marks]

3. A body of mass 50.0 kg moving with a velocity of  $20.0 \text{ ms}^{-1}$  is brought to rest by a constant force in a distance of 5.00 m.

(a) Calculate the change in kinetic energy of the body. [3 marks]

(b) What is the work done in stopping the body? [2 marks]

(c) Determine the size of the force acting on the body.

[3 marks]

4. A lift of combined mass  $2.05 \times 10^3 \text{ kg}$  is moving upwards at a constant velocity of  $7.00 \text{ ms}^{-1}$ . It then decelerates to a stop in  $4.00 \text{ s}$  as it reaches the top floor.

(a) Calculate the deceleration of the lift.

[3 marks]

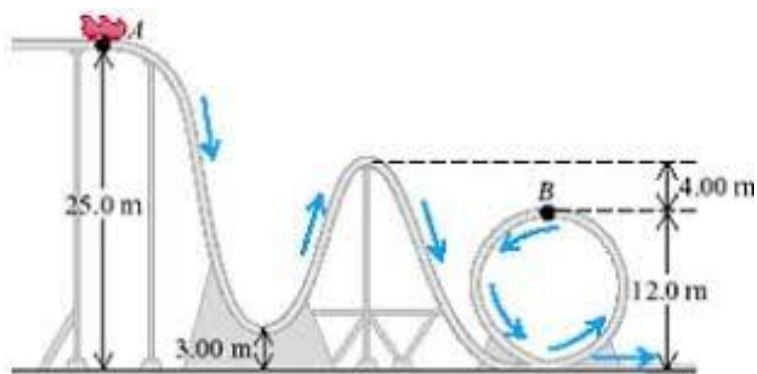
(b) the tension in the cable while the lift stops.

[3 marks]

- (c) the apparent weight of an 80.0 kg person in the lift during the last part of its motion.  
[3 marks]

5. Describe **ALL** of the energy changes that take place when a 65.0 g golf ball is dropped from a height of 2.00 m onto a concrete floor and rebounds to 1.40 m above the floor. (Include numerical energy values in your answer.)  
[5 marks]

6. The diagram below shows a roller coaster of mass  $3.50 \times 10^3 \text{ kg}$  moving at  $5.00 \text{ ms}^{-1}$  at point A. Assume the track is smooth and friction is negligible.



- (a) Determine the total energy of the roller coaster at point A. [3 marks]

- (b) Calculate the speed of the roller coaster at point B. [3 marks]

7. A 20.0 g bullet travelling at  $2.50 \times 10^2 \text{ ms}^{-1}$  strikes a block of wood of mass 2.00 kg that is suspended on a long string. The bullet embeds in the block.

(a) With what velocity will the block and bullet move after the collision? [3 marks]

(b) Is mechanical energy conserved in this system? Justify your answer by comparing the kinetic energy of the system before and after the bullet embeds. [5 marks]