

## ENGINEERING SCIENCE N4 TUTORIAL ASSIGNMENT

1.1. Two vehicles move simultaneously, vehicle P moves at 220 km/h east while vehicle Q moves at 220 km/h in a direction  $W30^\circ N$ . Calculate the velocity of vehicle P relative to Q. (4)

1.2. Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (3.1–3.4) in the ANSWER BOOK.

The minute arm of a tower clock is 1,8 m long. It took 35 minutes to move from 2 to 9.

1.2.1 The angular displacement of the minute arm is ...  
A 2,345 rad.  
B 3,665 rad.  
C 3,345 rad.  
D 2,665 rad.

1.2.2 The arc length produced by the tip of the minute arm is ...  
A 4,835 m.  
B 5,524 m.  
C 6,597 m.  
D 4,524 m.

1.2.3 The angular velocity of the minute arm is ...  
A  $2,327 \times 10^{-3}$  m.  
B  $1,745 \times 10^{-3}$  m.  
C  $2,117 \times 10^{-3}$  m.  
D  $1,227 \times 10^{-3}$  m.

1.2.4 The linear velocity/tangential velocity of the minute arm is:  
A  $2,447 \times 10^{-3}$  m/s.  
B  $4,189 \times 10^{-3}$  m/s.  
C  $4,447 \times 10^{-3}$  m/s.  
D  $3,141 \times 10^{-3}$  m/s.

(4 × 2)

[8]

1.3.A priest is in a rested motorcar, with a mass of 780 kg, at the top of a slope of 80%. When he releases the brakes of the motorcar, it moves freely down for 25 m due to gravitational force to the bottom of the slope and then immediately onto a horizontal road until it comes to a rest at the bottom of the slope. Calculate the following:

1.3.1 The velocity of the motorcar at the bottom of the slope. (3)

1.3.2 The deceleration of the motorcar on the horizontal road, if it took 12 seconds to travel on the horizontal road. (2)

1.3.3 What is the kinetic energy of the motorcar after 12 seconds on the horizontal road? (1)

1.4. The plunger of a hydraulic press has a diameter of 90 mm with a stroke length of 480 mm while the diameter of the ram is 180 mm. The mechanical advantage of the plunger is 18.

Calculate:

1.4.1 The force to be applied to the lever to lift a load of 4,2 Mg if efficiency is 96% (5)

1.4.2 The number of the pumping strokes needed to lift the load of 220 mm at efficiency of 96%. [4]

1.5. The plunger of a two-cylinder pump has a diameter of 150 mm and a stroke length of 250 mm.

Calculate:

1.5.1 The volume delivered in l/s. (4)

1.5.2 The slip% if the volume delivered is 16,789 l/s. (2)

## TUTORIAL 2

2.1. A stone is thrown at a velocity of 29 m/s at an angle of  $35^\circ$  to the horizontal.

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**Padhraic Smyth**



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