3.2 Mechanics: Forces and Newton's Laws: 10-minute Pack

EDEXCEL 9MA0 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A particle of mass 3 kg hangs in equilibrium, suspended from a fixed point by a light inextensible string. Take g = 9.8 m/s^2. Find the tension in the string.

(Total for Question 1 is 1 mark)

2 A resultant force of 12 N acts on a particle of mass 3 kg. Find the acceleration of the particle.

(Total for Question 2 is 1 mark)

3 State Newton's third law of motion.

(Total for Question 3 is 1 mark)

4 State what is meant by modelling a surface in mechanics as "smooth".

(Total for Question 4 is 1 mark)

5 A block of mass 5 kg rests on rough horizontal ground. The maximum frictional force before the block slips is found to be 14.7 N. Take g = 9.8 m/s^2. Find the coefficient of friction between the block and the ground.

(Total for Question 5 is 2 marks)

6 A student attempts to find the tension in the cable of a lift of mass 900 kg accelerating upwards at 0.5 m/s^2. Take g = 9.8 m/s^2. The student's working is shown below, but the final answer is incorrect.

T - mg = ma
T = m(g - a)
T = 900 x (9.8 - 0.5)
T = 8370

(a) Identify the error in the student's working. **(1)**

(b) Find the correct value of the tension. **(1)**

(Total for Question 6 is 2 marks)

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Mark scheme · 3.2 Mechanics: Forces and Newton's Laws: 10-minute Pack

Question 1

29.4 cao **B1**

Answer: 29.4 N

Question 2

4 cao **B1**

Answer: 4 m/s^2

Question 3

if body A exerts a force on body B, then body B exerts a force of the same magnitude but in the opposite direction on body A (oe) **B1**

Answer: If A exerts a force on B, then B exerts an equal and opposite force on A.

Question 4

it exerts no friction (the frictional force is negligible / zero) (oe) **B1**

Answer: It exerts no frictional force (friction is negligible).

Question 5

R = mg = 5(9.8) = 49, then μ = F/R (oe) **M1**

0.3 cao **A1**

Answer: 0.3

Question 6

(a) the student wrote T = m(g - a); since the lift accelerates upwards, T - mg = ma gives T = m(g + a), so a should be added to g, not subtracted (oe) **B1**

(a) Answer: The student subtracted a from g instead of adding it: T should equal m(g+a), not m(g-a).

(b) 9270 cao **B1**

(b) Answer: 9270 N

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