Test - Forces in two dimensions and friction

Year: Year 13 · Duration: 40 minutes · /20

Name:	Date:	**Mark: /20**

Question	1	2	3	4	5	Total
marks	4	4	5	4	3	**20**
Mark						

Show your working.

Question 1 (4 marks)

Question 1 – Resolving and resultant

Two forces act on a particle. One is 15 N due east and the other is 10 N at 50° north of east.

a. Find the resultant force: its magnitude and its direction. [4 marks]

Question 2 (4 marks)

Question 2 – A framed picture

A picture of weight 60 N hangs from two light strings that make angles of 35° and 55° with the horizontal. Find the tension in each string.

Question 3 (5 marks)

Question 3 – A crate pulled by a rope

A crate of mass 12 kg is on a rough horizontal floor with coefficient of friction 0.3. It is pulled by a rope with tension 40 N at 30° above the horizontal. Take $g = 9.8$ m s^{-2}.

a. Find the normal reaction. [2 marks]
b. Find the maximum friction and show that the crate moves. [2 marks]
c. Find the acceleration. [1 mark]

Question 4 (4 marks)

Question 4 – On a slope

A block of mass 5 kg is placed on a rough plane inclined at 35° to the horizontal. The coefficient of friction is 0.4.

a. Show that the block slides. [2 marks]
b. Find its acceleration. [2 marks]

Question 5 (3 marks)

Question 5 – Connected particles

A particle of mass 3 kg on a smooth horizontal table is connected by a light string over a smooth pulley to a particle of mass 2 kg hanging freely. Find the acceleration and the tension.