



Essential Pre-Uni Physics B1.6

GCSE A Level

A trolley has a weight of 11 N and sits on a ramp inclined at 33° to the horizontal. How big is the component of the weight which is trying to pull the trolley along the ramp? Give your answer to 2 significant figures.

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Physics. *You work it out.*

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Essential Pre-Uni Physics B2.2



Where bearings are given, they are in degrees East of North (so North is 000° , East is 090° , South is 180° and West 270°). For the purposes of this exercise, assume the Earth is flat.

Part A Rowing speed

a) Work out how fast I am going (relative to a ground-based observer) if I row at 9.0 m s^{-1} South (relative to the water) in a river where the water is flowing 1.0 m s^{-1} South.

Part B Swimming speed

b) Work out how fast I am going (relative to a ground-based observer) if I swim at 1.0 m s^{-1} North (relative to the water) in a river where the water is flowing 0.30 m s^{-1} East.

Part C Swimming direction

c) In what direction would a ground-based observer think I was swimming in part (b)? Give your answer as a number of degrees East of North (a bearing). Give your answer to 2 significant figures.

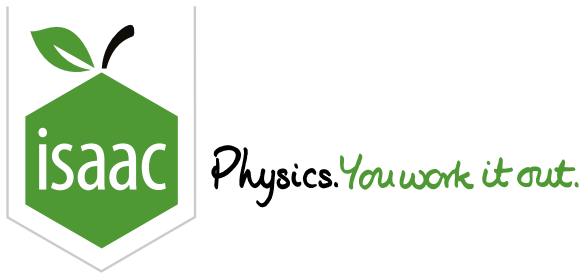
Part D Flying speed

d) Work out how fast I am going (relative to a ground-based observer) if I fly at 100 km h^{-1} North-West (relative to the air) when the wind is blowing from the North-East at a speed of 20 km h^{-1} . Give your answers to 2 significant figures.

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Essential Pre-Uni Physics B3.4

GCSE

A Level

A high performance car can travel from rest to 25 m s^{-1} in 5.0 s .

Part A Acceleration

What is its acceleration?

Part B Distance travelled

How far does the car travel while accelerating?

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Essential Pre-Uni Physics B3.9



Assume that any dropped or thrown object accelerates downwards at 9.8 m s^{-2} . If a question says that an object is 'dropped' this means that its velocity is zero at the beginning of the motion.

Please give your answers to 2 significant figures. If asked for a velocity or displacement, your answer **MUST** contain a direction in order to be marked as correct. Take the positive direction to be upwards.

You want to fire a ball vertically into the air so that it goes 100 m up before coming back down again (its maximum height is 100 m). How fast should you fire it?

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Essential Pre-Uni Physics B4.7

A Level



You are trying to drop essential survival supplies from an aeroplane to help the survivors of a crash who are stranded. You are flying 300 m above them, and your aircraft can travel no slower than 30 m s^{-1} . You fly on a straight line which will pass over the survivors.

How far (in metres) in advance of overflying the survivors do you need to drop the package? Assume that the downward acceleration is 9.8 m s^{-2} . Please give your answer to 2 significant figures.

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Essential Pre-Uni Physics B4.8

A Level

C

C

C

A rugby player is aiming for a conversion. They kick the ball at 15 m s^{-1} at an angle of 50° to the horizontal. At the time, they are 20 m from the posts.

Assume that the downward acceleration is 9.8 m s^{-2} .

Part A Time to reach the posts

How much time will the ball take to reach the posts?

Part B Height at the posts

How high will the ball be when it reaches the posts?

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Essential Pre-Uni Physics B5.3



The strength of Earth's gravity at ground level = 9.8 N kg^{-1} . 1 tonne = 1000 kg.

Where forces are asked for, ensure that the direction is in the answer (e.g. up/down). Assume that the mass is evenly distributed in the rulers, poles, planks, bridge spans mentioned in the questions.

A 200 m bridge span is supported at both ends. The span has a mass of 100 tonnes. A 30 tonne bus is 50 m from one end of the span. Calculate the supporting force holding the bridge up at the end nearer the bus. Please give your answer to 2 significant figures.

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Essential Pre-Uni Physics B5.7

A Level

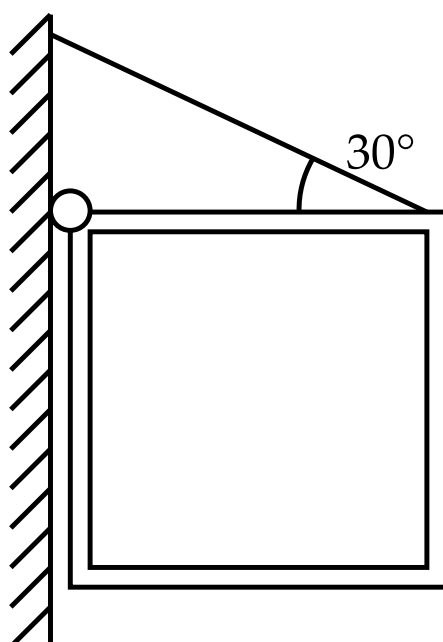


Figure 1: Diagram showing the pub sign.

The pub sign shown above is supported by a hinge and by a metal rod.

Note: The strength of Earth's gravity at ground level = 9.8 N kg^{-1} .

Calculate the tension in the rod if the pub sign is an 80 cm square of mass 30 kg. Ignore the mass of the rod, assume that the hinge is well-oiled, and assume that the mass is evenly distributed in the sign. Give your answer to 2 significant figures.

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Essential Pre-Uni Physics B8.2



Physical constants which may be necessary to answer the problems on this page can be found within the hint tabs.

Part A GPE lost by the ball

An object of mass 3.5 kg slides all the way down a slope inclined at 40° to the horizontal, with a base of length 4.8 m . How much GPE does the object lose?

Part B Work done by the ball against friction

If the average frictional forces are 4.0 N , work out how much work the object does against friction.

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Essential Pre-Uni Physics B8.6

GCSE

A Level

A 1300 kg car travels at a steady speed, covering 75 m in 5.0 seconds. Frictional forces are constant and are 450 N in total. Work out the power output of the engine, assuming 100 % efficiency.

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