Try a daily question on P3 each day in April 2017

APRIL (P3)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
					1st	2nd

1st / 2nd

Stopping distances are important for road safety.
The Highway Code uses diagrams to show stopping distances.
There are two parts to the stopping distance;

- thinking distance
- braking distance.

Both of these can be increased by different factors.
Explain in detail how road conditions, speed and alcohol can affect road safety.
[6 marks]

3rd

State Newton's 3 Laws of Motion and describe briefly an example of a real life scenario in which Newton's laws are obeyed for each law.

4th

The table shows air resistance on a bicycle at different speeds:

Speed (m/s):	0	1	2	3	4	5
Friction (N):	0	10	30	70	130	200

a) Sketch a graph of this data
b) How fast can the cyclist travel is she can exert a push of 180 N?
c) When the cyclist crouches lower, she travels faster, explain why.

5th

Complete the following sentences:
a) The work done (in …..) is equal to the…. (in N) multiplied by the …. moved (in m)
b) The principle of …… of …..says that energy can be …. from one form to another, but it cannot be …. or ….. .
c) 1 Watt is the rate of working of one …. per ….. .

6th

A car of mass 1000 kg is travelling at 30 m/s.
a) What is its kinetic energy?
b) It slows to 10 m/s. What is the KE now?
c) What is the change in kinetic energy?
d) If it takes 80 m to slow down buy this amount , what is the average braking force?

7th

A girl of mass 50kg climbs a vertical distance of 20 m.
a) What is her work done?
b) If she accomplishes this in 32 seconds, what power does she develop?

8th / 9th

Friction is generally considered to be a nuisance, whilst considered correct in 'every day contexts', this idea is nonsense. Identify reasons for both why it is considered a nuisance and why it is extremely useful, try 5 for each with explanations.

10th

Sketch 5 distance-time graphs and 5 velocity-time graphs for an object undergoing the following motion;
1. Stationary
2. Constant velocity
3. Constant acceleration
4. Deceleration
5. Return home at a constant velocity

11th

A lift carries 4 passengers of average mass 62 kg each, if the lift moves at a speed of 2.4 m/s and travels for 25 m;
a) What is the total distance the lift travels?
b) How much work is done on the passengers?
c) What is the average power of the lift?

12th

State and explain some factors that affect the following;
a) Thinking distance
b) Braking distance
c) Maximum speed obtainable

13th

A pole vaulter has a mass of 50 kg.
a) what is her weight in Newtons?
b) If she vaults to 4 m high, what is her gravitational potential energy?
c) How much kinetic energy does she have just before reaching the ground?

14th

Define the following terms
a) Resultant force
b) Stopping distance
c) Reaction (or Normal) force
d) Terminal velocity

15th / 16th

Susie is a skydiver. As she falls from the aeroplane her speed changes. Draw a velocity time graph representing her motion over time. Include the following
a) Immediately after falling
b) The motion as she accelerates
c) Terminal velocity
d) The deployment of the parachute
e) The new terminal velocity

Explain each of the above sections with regards to the forces acting on Susie.

17th

A girl throws a ball upwards at a velocity of 10 m/s (assuming gravitation acceleration to be 9.8 m/s² in the opposite direction and the velocity at the peak point to be 0 m/s. How high does it go?

18th

The highway code says that at 20 m/s, the reaction distance of a driver is 14 m, and the brakes take 3 s to halt the car.
a) What is the reaction time in this case?
b) Plot a velocity-time graph for this data (assume steady deceleration with the brakes applied)
c) Use this sketch to estimate the speed at which the driver would hit a wall 3 s after first noticing it.

19th

Explain the following:
a) A gun recoils when it is fired
b) Firemen have to brace themselves when aiming a fire hose
c) You, by yourself, can move our planet
d) An astronaut is drifting away from his spaceship. How can he return using only an aerosol spray?

20th

a) State the principle of conservation of energy.
b) Only a small amount of chemical energy stored in the petrol of a car engine is changed into KE, which other forms of energy could this chemical energy be converted into?
c) A cars engine uses fuel at a rate of 105 kW and converts it into useful power at a rate of 21 kW. Calculate the efficiency.
d) Suggest a way in which fiction is a nuisance in car and how it can be reduced.

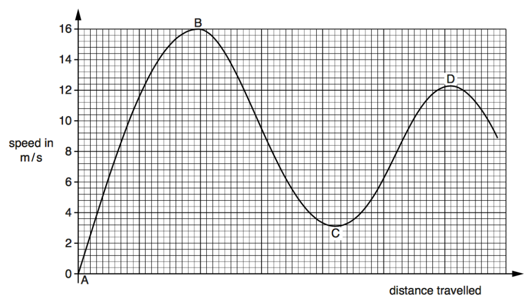
21st

A mass of 5 kg changes its velocity from 4 m/s to 24 m/s in 10 s. Calculate;
a) The acceleration
b) The force needed for this acceleration
c) the momentum at the start
d) the kinetic energy at the start
e) the kinetic energy after 2 s.

22nd

Look at the graph opposite:
It shows how the speed of a rollercoaster car changes with distance travelled along part of the track.
The rollercoaster starts from rest at the top of the track at **A.**
The car and its passenger has a total mass of 400kg.
Describe how the KE and GPE of the car change in sections AB and BC. Calculate the difference in height of the rollercoaster between A and B. what assumptions have you made.

23rd



24th

The output power of a small car engine is 2000 W.
a) What does this statement mean?
b) How much work does the engine do in 30 s?
c) If the efficiency of the engine is 25%, how mush energy is supplied to the engine in 30 s?

25th

An astronaut has a mass of 100 kg, What is his weight;
a) On Earth
b) On the moon (where the gravitational field strength is 1.6 N/kg)

26th

A rollercoaster full of passengers wth a total mass of 12,600 kg is dragged up to a height of 92 m.
a) What is the rollercoasters maximum gravitational potential energy?
b) What is its maximum kinetic energy?
c) What is the rollercoasters maximum speed?

27th

A Saturn V Moon rocket has a mass at lift-off of 3.0×10^6 kg. The thrust at lift-off is 3.3×10^7 N. Find;
a) The weight of the rocket on Earth
b) The resultant force at lift-off
c) The acceleration at lift-off
d) Suggest why the acceleration of the rocket will increase with time.

28th

Battery powered cars do not pollute when they are being driven, but they still cause pollution. Explain how.

Discuss the pros and cons of electric cars compared to traditional petrol/ diesel cars.

29th

Scientists investigate the safety of seat belts. They use two cars. Each car has an identical dummy in the driver's seat. Both cars are crashed, at the same speed, into identical barriers.
In one car, the dummy is wearing a seat belt, In the other car, the dummy is not and hits the windscreen in the collision.
Calculate the missing data and use the information in the table to explain how seat belts reduce injury in a crash.

30th

	Crash with seat belt	Crash without seat belt
Mass of dummy	60 kg	60 kg
Distance travelled by dummy whilst stopping	60 cm after seat belt locked	20 cm after hitting windscreen
Time taken for dummy to stop moving	0.08 sec	0.03 sec
Deceleration	175 m/s²	467 m/s²
Stopping force	10500 N	

Mr Murray-Smith

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