Topic Test: OxfordAQA International GCSE Combined Science 9204 Physics

Forces and their effects

Name: _____

Class: _____

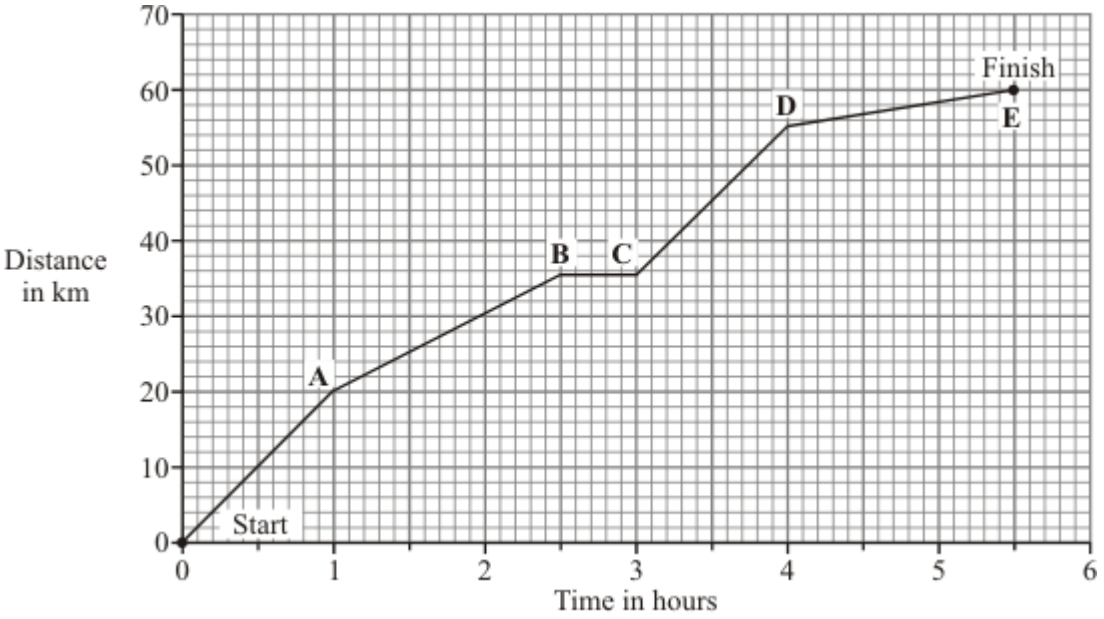
Date: _____

Time: **32 minutes**

Marks: **32 marks**

Comments:

1 A horse and rider take part in a long distance race. The graph shows how far the horse and rider travel during the race.



(a) What was the distance of the race?

distance = _____ km

(1)

(b) How long did it take the horse and rider to complete the race?

_____

(1)

(c) What distance did the horse and rider travel in the first 2 hours of the race?

distance = _____ km

(1)

(d) How long did the horse and rider stop and rest during the race?

_____

(1)

(e) Not counting the time it was resting, between which two points was the horse moving the slowest?

_____ and _____

Give a reason for your answer.

_____

_____

(2)

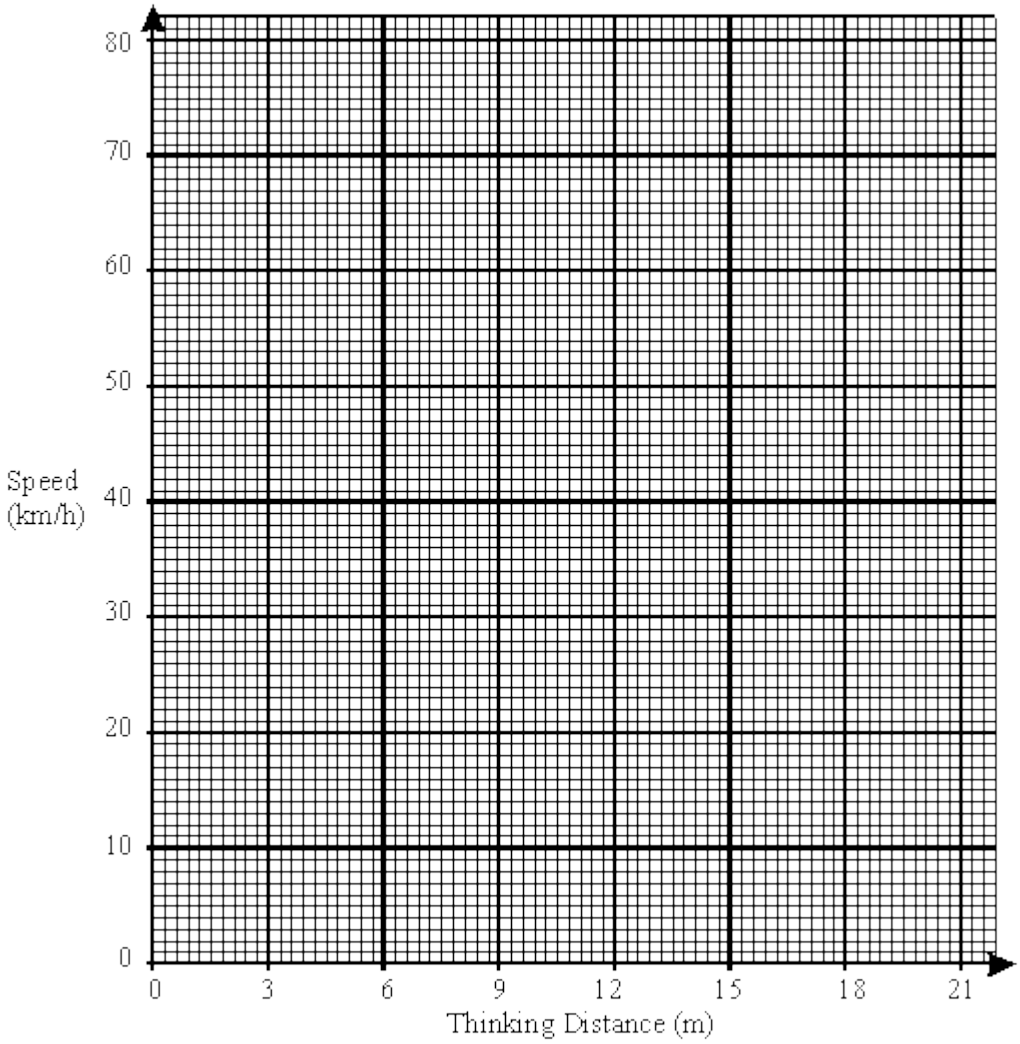
(Total 6 marks)

2 When a car driver has to react and apply the brakes quickly, the car travels some distance before stopping. Part of this distance is called the "thinking distance". This is how far the car travels while the driver reacts to a dangerous situation.

The table below shows the thinking distance (m) for various speeds (km/h).

Thinking distance (m)	0	9	12	15
Speed (km/h)	0	48	64	80

(a) On the graph paper below, draw a graph of the thinking distance against speed.



(2)

(b) Describe how thinking distance changes with speed.

_____

_____

(1)

(c) The time the driver spends thinking before applying the brakes is called the “thinking time”.

A driver drank two pints of lager. Some time later the thinking time of the driver was measured as 1.0 seconds.

(i) Calculate the thinking distance for this driver when driving at 9 m/s.

_____

_____

Answer _____ m

(1)

(ii) A speed of 9 m/s is the same as 32 km/h. Use your graph to find the thinking distance at 32 km/h for a driver who has not had a drink.

_____

Answer _____ m

(1)

(iii) What has been the effect of the drink on the thinking distance of the driver?

_____

_____

(1)

(Total 6 marks)

3 The diagram shows the horizontal forces acting on a car travelling along a straight road.

(a) Complete the following sentences by drawing a ring around the correct word in each box.

(i) When the driving force equals the drag force, the speed of the car is

decreasing
constant
increasing

(1)

(ii) Putting the brakes on transforms the car's kinetic energy mainly into

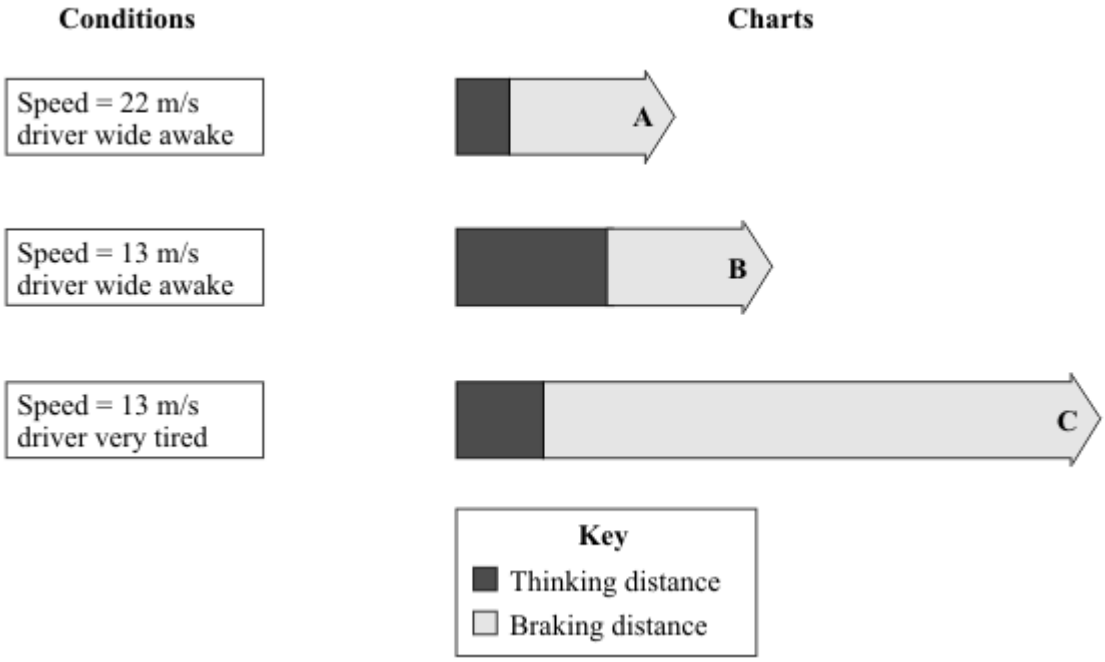
heat
light
sound

(1)

(b) The charts, **A**, **B** and **C** give the thinking distance and the braking distance for a car driven under different conditions.

(i) Draw straight lines to match each chart to the correct conditions.

Draw only **three** lines.



(2)

(ii) The three charts above all apply to dry road conditions.

How would the braking distances be different if the road were wet?

_____

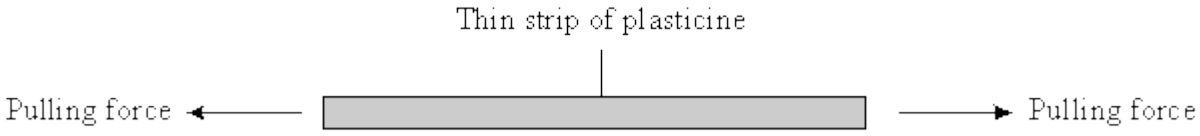
_____

(1)

(Total 5 marks)

4 (a) The diagrams below show pairs of forces acting on different objects. In each case describe what happens when the forces are increased. Then describe what happens when the forces are removed.

(i)



When the forces are increased

_____

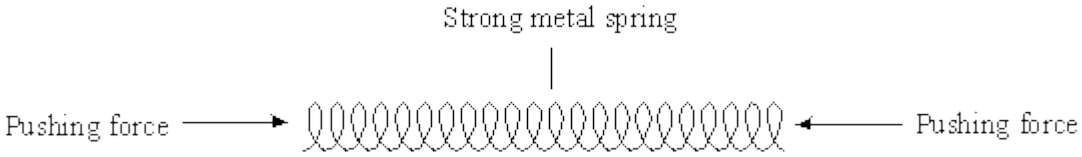
_____

When the forces are removed

_____

_____

(ii)



When the forces are increased

_____

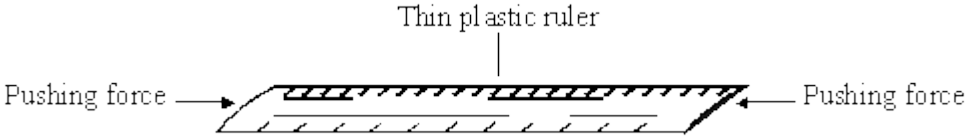
_____

When the forces are removed

_____

_____

(iii)



When the forces are increased

_____

_____

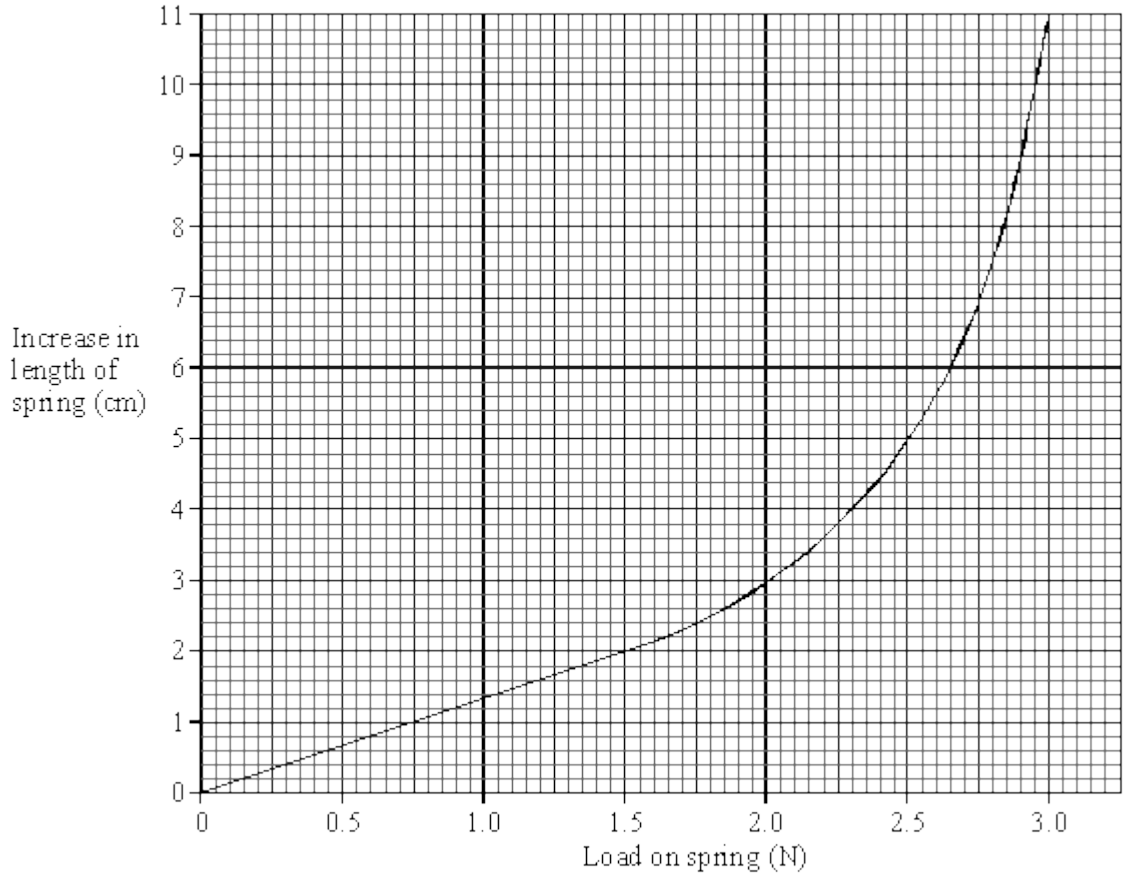
When the forces are removed

_____

_____

(6)

(b) The graph shows the increase in length of a spring against **load** (force).



The length of the spring with no load was 15 cm.

Use the graph to find:

(i) The load needed to produce an increase in length of 2 cm.

_____

(ii) The increase in length produced by a load of 2.3 N.

_____

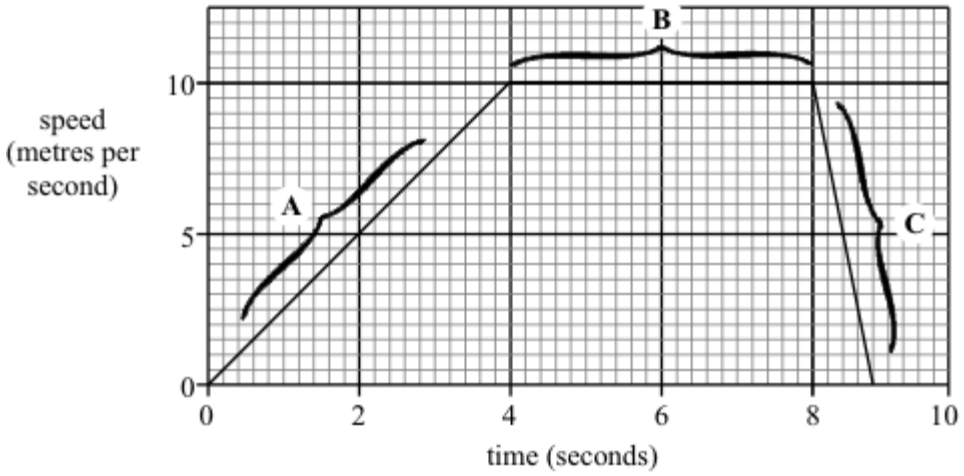
(iii) The **length** of the spring when the load was 2.3 N.

_____

(3)

(Total 9 marks)

5 The graph shows the speed of a runner during an indoor 60 metres race.



(a) Choose words from this list to complete the sentences below.

moving at a steady speed **slowing down**

speeding up **stopped**

Part **A** of the graph shows that the runner is _____

Part **B** of the graph shows that the runner is _____

Part **C** of the graph shows that the runner is _____

(3)

(b) Calculate the acceleration of the runner during the first four seconds.
(Show your working.)

_____

_____

_____

(3)

(Total 6 marks)

1 (a) 60

1

(b) $5\frac{1}{2}$ hours

must include unit

1

(c) 30

1

(d) 30 minutes or

$\frac{1}{2}$ hour

must include unit

1

(e) D **and** E

accept finish for E
accept correct numbers from axes with units

1

least steep part of the graph

accept covers smallest distance in a set time
accept only moves 5 km in 1 ½ hours (accept anything between 5 and 6)
ignore horse is tired

1

[6]

2 (a) points correct; line correct

for 1 mark each

2

(b) increases

for 1 mark

1

(c) (i) 9

for 1 mark

1

(ii) 6 ecf

for 1 mark

1

(iii) increased ecf

for 1 mark

1

[6]

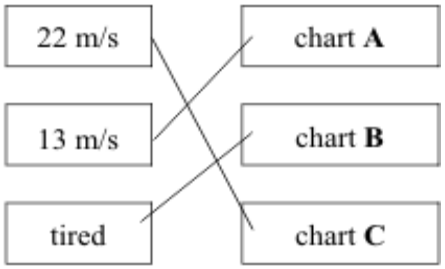
3 (a) (i) constant

1

(ii) heat

1

(b) (i) 3 links correct



*allow **1** mark for 1 correct link*

if more than one line is drawn from a condition mark all lines from that condition incorrect

2

(ii) increased

1

[5]

4 (a) (i) plasticine stretches/snaps
stays stretched/snapped

for 1 mark each

2

(ii) spring compresses OWTTE
returns to **original** length/shape or gets longer

for 1 mark each

2

(iii) ruler bends/breaks
returns to original shape or stays broken

for 1 mark each

2

(b) (i) 1.5N

for 1 mark

1

(ii) 4 cm

for 1 mark

1

(iii) 19 cm

for 1 mark

1

[9]

5 (a) A = speeding up

[Accept 'accelerating / acceleration / going faster]

B =moving at a steady speed

[Accept 'constant speed']

C = slowing down

[Accept 'going slower' / decelerating]

each for 1 mark

3

(b) acceleration = $\frac{\text{change in speed/velocity}}{\text{time taken}}$

NB if formula given must be correct

or $\frac{10}{4}$

gains 1 mark

but 2.5

gains 2 marks

unit m/s^2 **or** metres per second squared

or metres per second per second

for 1 mark

or m/s^{-2}

[Credit even if no / an incorrect numerical answer is given]

3

[6]