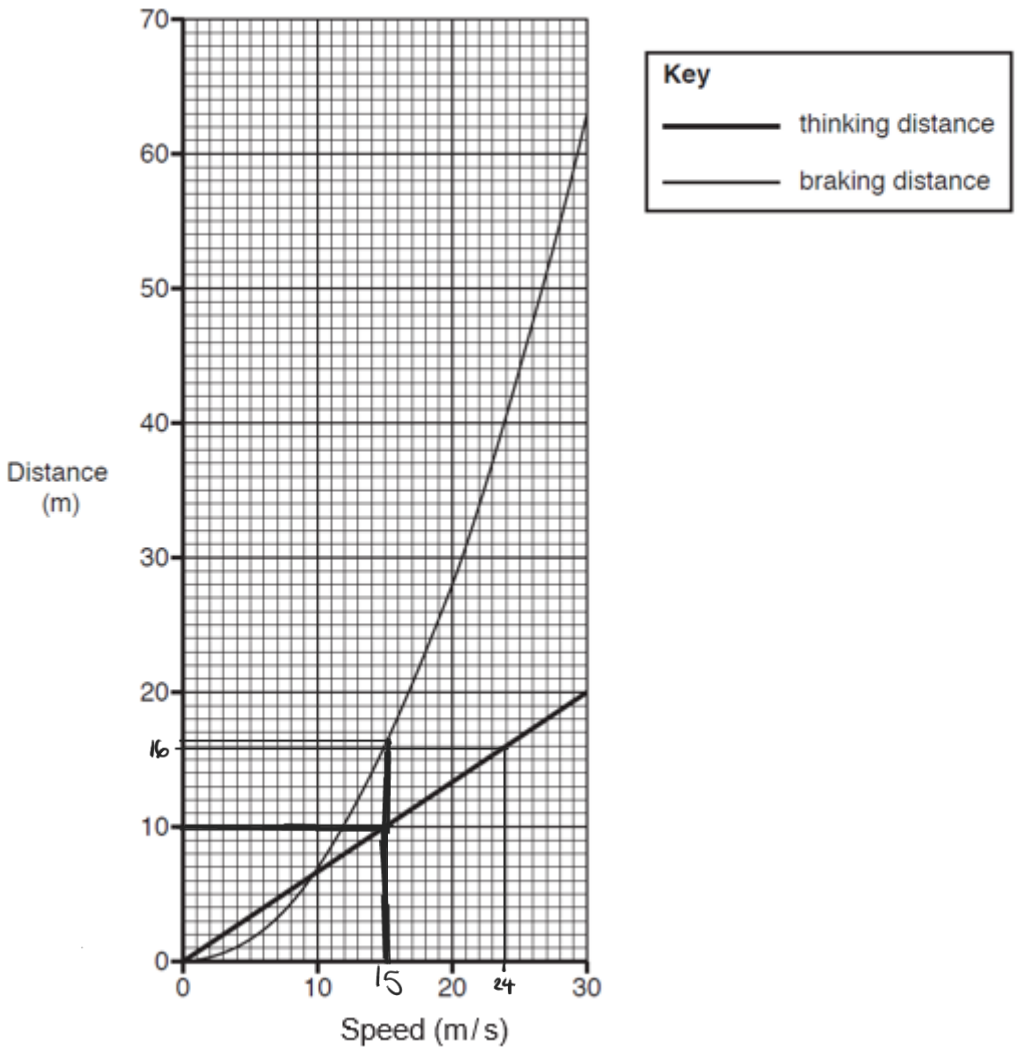
Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/04 Physics A P5-P8 and P9 (Higher Tier)

Question Set 7

1 The graph shows thinking and braking distances for a car at different speeds.



(a) (i) Describe how **thinking distance** varies with increasing speed.

Use data from the graph in your answer.

As speed increases, thinking distance increases.
Thinking distance and speed is directly proportional → linear graph going through the origin.

[2]

(b) (i) Use the graph to find the **thinking distance** at 24 m/s.

Thinking distance = 16 ..... m

[1]

(ii) Calculate the **thinking time** at 24 m / s.

Use your answer to **(b)(i)** and the equation: distance travelled = speed × time

Give your answer to **2** decimal places.

$\frac{\text{distance}}{\text{speed}} = \text{time}$ $\quad \frac{16}{24} = 0.66\dot{}$ seconds

$= 0.67$ seconds (2dp)

Thinking time = ...0.67... s

[3]

(c) **(i)** State **one** factor that could **increase** thinking distance.

- Drinking alcohol / Take drugs
- Being tired

[1]

(ii) Calculate the **stopping distance** at 15 m / s.

At 15m/s:

Use the graph to help you.

Thinking distance: 10m

Braking distance: 16.5m

$10 + 16.5 = 26.5$

Stopping distance = ...26.5... m

[2]

(d) How does the speed affect the **kinetic energy** and **braking distance** of the car?

Use the graph in your answer.

$KE = \frac{1}{2}mv^2 \therefore KE \propto v^2 \rightarrow$ if speed doubles, KE quadruples

Therefore if kinetic energy increases (due to speed increasing) then braking distance increases, as it will take longer to transfer the KE into thermal (in order to stop the car).

[3]

Total Marks for Question Set 7: 12