Stopping Distance Questions for GCSE Physics

1. State the two parts that make up the stopping distance of a vehicle.

Thinking Distance and Braking Distance

2. What is meant by *thinking distance*?

The distance travelled by a vehicle during the driver's reaction time (from seeing a hazard to pressing the brake pedal).

3. What is meant by *braking distance*?

The distance travelled by a vehicle from when the brakes are applied to when the vehicle comes to a complete stop.

4. At what points does the thinking distance begin and end?

Begins when the driver sees the hazard

Ends when the driver presses the brake pedal

5. Write the equation that links thinking distance, speed and reaction time.

Thinking distance=speed×reaction time

6. State **two factors** that can increase a driver's reaction time.

Any two of:

• Tiredness; • Alcohol; • Drugs; • Using a mobile phone; • Lack of concentration

7. Explain why poor visibility (e.g. fog) does **not directly** increase thinking distance.

Thinking distance only starts once the driver has seen the hazard. Poor visibility affects how soon a hazard is seen, but not the reaction time after it has been seen.

8. A driver is using a mobile phone while driving. Explain how this affects the thinking distance.

Using a mobile phone increases the driver's reaction time, which increases the thinking distance because thinking distance is equal to speed multiplied by reaction time.

9. A car travels at **13 m/s** (30mph). The driver's reaction time is **0.5 s**. Calculate the thinking distance.

Thinking distance = speed x reaction time = 13 × 0.5 = ***6.5 m***

10. A car is travelling at **22 m/s** (50mph) and the driver has a reaction time of **0.7 s**. Calculate the thinking distance.

Thinking distance = speed x reaction time = 22 × 0.7 = ***15.4 m***

11. A driver reacts in **0.4 s**. Calculate the thinking distance when the car is travelling at **15 m/s**.

Thinking distance = speed x reaction time = 15 × 0.4 = ***6 m***

12. State **three factors** that can increase braking distance.

Any three of;

• Worn tyres; • Poorly maintained brakes; • Water, ice, oil or mud on the road; • Uneven road surfaces;

• High speed.

13. Explain why worn tyres increase the braking distance of a car.

Worn tyres provide ***less friction*** *between the* ***tyres and the road****, reducing the braking force and increasing the braking distance.*

14. At speeds above **20 mph**, which part of the stopping distance is usually greater — thinking distance or braking distance?

Braking Distance

15. A car doubles its speed. State what happens to: a) the thinking distance, b) the braking distance.

a) *The thinking distance doubles*

b) *The braking distance increases by four times*