Candidate Name	Centre Number	Candidate Number
		0

GCSE

241/01

ADDITIONAL SCIENCE
FOUNDATION TIER
PHYSICS 2

P.M. WEDNESDAY, 11 June 2008

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**4**	
3.	**9**	
4.	**7**	
5.	**5**	
6.	**6**	
7.	**7**	
8.	**8**	
Total	**50**	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

A list of equations is printed on page 2 of the examination paper. In calculations you should show all your working.

EQUATIONS

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

$$\text{current} = \frac{\text{power}}{\text{voltage}}$$

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time}}$$

$$\text{resultant force} = \text{mass} \times \text{acceleration}$$

$$\text{work} = \text{Force} \times \text{distance}$$

Answer **all** *questions in the spaces provided.*

1. Circuits and users are protected by the following safety features:

fuse **miniature circuit breaker (mcb)** **residual current device (rcd)** **earth wire**

(i) Name a safety feature that prevents cables becoming too hot. [1]

.....

(ii) Name a safety feature that detects a difference in current between the live and neutral wires. [1]

.....

(iii) Name a safety feature that will cause a fuse to blow if current flows through it. [1]

.....

(iv) Name a safety feature that needs replacing once it acts. [1]

.....

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Examiner only

2. The table shows the power rating and working current for a number of electrical appliances. Each of the appliances uses 230 volts.

appliance	**power (W)**	**current (A)**	**voltage (V)**
cooker	6210	27	230
iron	920	4	230
dishwasher	.....	8	230

(a) Use the equation to complete the table. [2]

Equation:

power = voltage × current

Calculation:

(b) (i) **Put a circle around** the fuse value in the list below, which should be fitted in the plug connected to the dishwasher. [1]

3A **5A** **13A**

(ii) The cooker circuit is connected directly to its own circuit breaker.
Give **one** reason why a 16 A miniature circuit breaker could not be used to protect the circuit. [1]

.....

4

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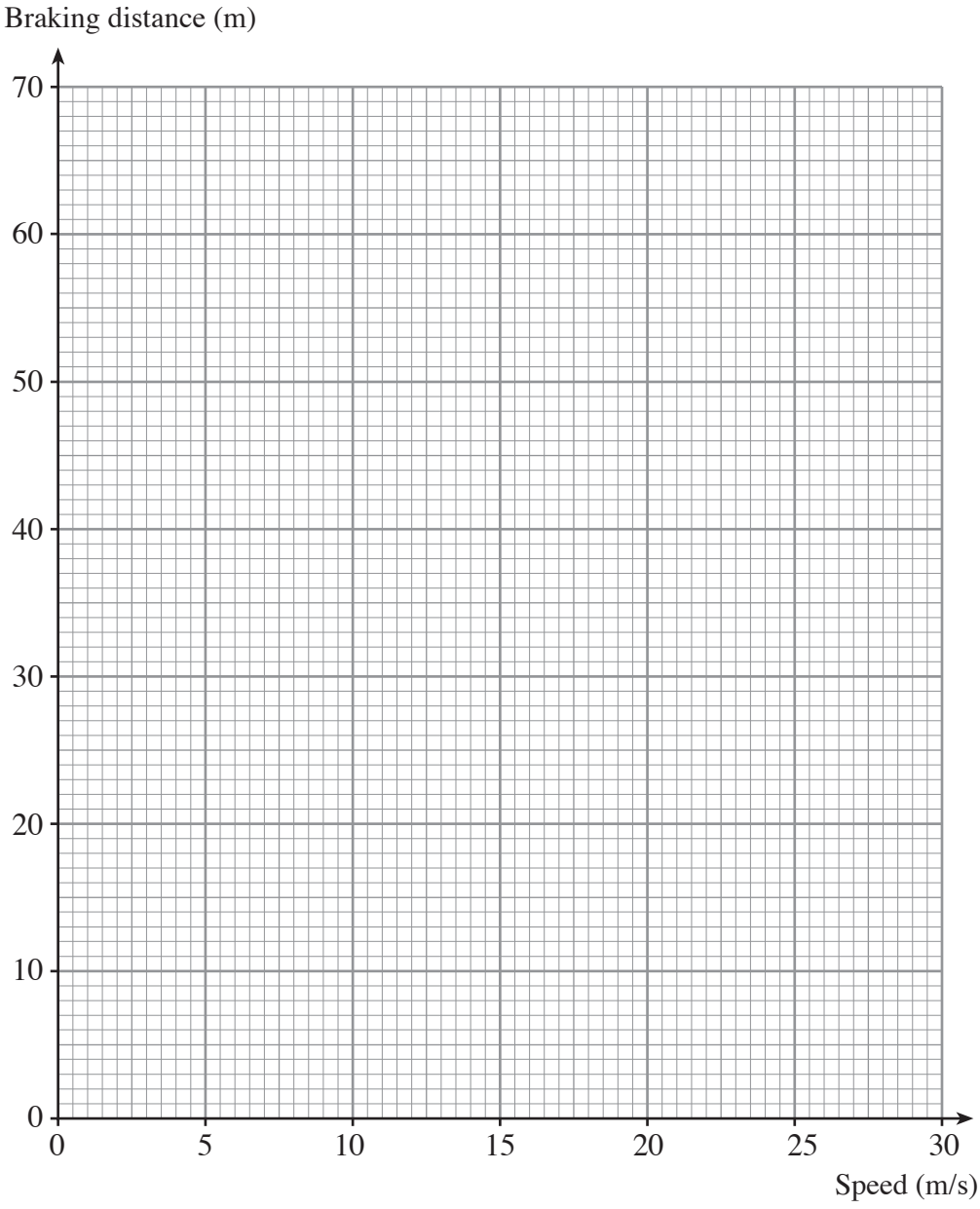
Turn over.

3. The table shows information about the braking distance for a car travelling at different speeds on a dry road.

Speed (m/s)	Braking distance (m)
0	0
10	7
15	16
20	30
25	46
30	65

(a) (i) Plot this information on the grid below and join the points with a smooth curve. [3]



(ii) Describe how the braking distance changes as the speed increases. [1]

.....

.....

(iii) Use the graph to find the braking distance for a speed of 5m/s. [1]

Braking distance = ... m

(b) (i) State what happens to the braking distance if the road is wet. [1]

.....

(ii) State what happens to the braking distance if the tyres have no tread. [1]

.....

(c) During a car accident, head injuries are caused when the driver's head hits the steering wheel.
Name **two** safety features that stop this happening. [2]

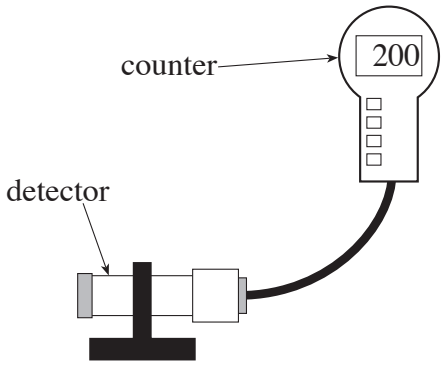
1. .....

2. .....

9

Examiner only

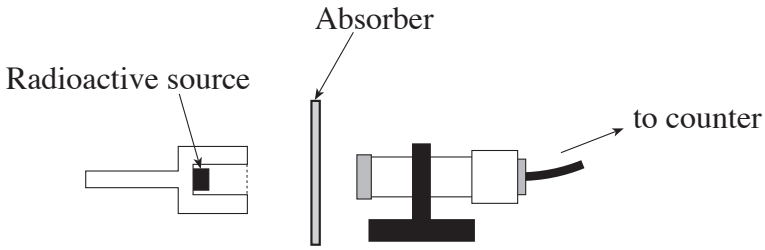
4. *(a)* The diagram shows a radiation detector being used to measure background radiation. It shows the radiation count after **ten minutes**.



Use the counter reading to calculate the average background radiation level in **counts per minute**. [1]

Counts per minute = ...

(b) The following apparatus is used to find the type of radiation that a radioactive source emits.



Different absorbers are placed one at a time between the detector and the radioactive source. For each absorber, the average number of counts per minute is worked out. The results are shown in the table.

Type of absorber	Average counts per minute	Average counts per minute after taking away background radiation
No absorber	2 360	2 340
paper	2 360	2 340
thick aluminium	20	.....

(i) **Complete the table.** [1]

(ii) Give a reason why the results show that the radioactive source does not emit alpha (α) radiation. [1]

.....

.....

(iii) Give a reason why the results show that the radioactive source does not emit gamma (γ) radiation. [1]

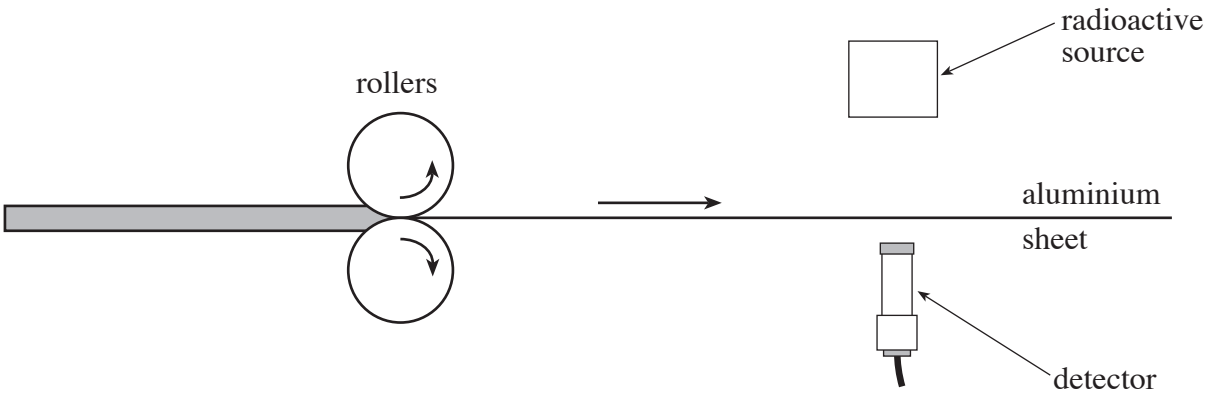
.....

.....

(iv) Name the type of radiation emitted by the source. [1]

.....

(c) The radioactive source is used in rolling mills to monitor the thickness of aluminium as it is rolled into sheets.



Complete the following sentences using the most suitable word from the box.

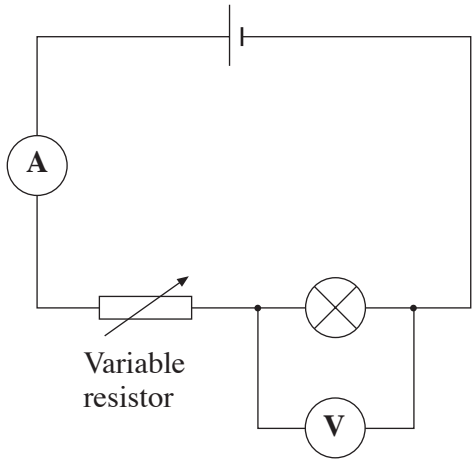
more	**the same**	**less**	**halved**	**doubled**

(i) If the aluminium sheet gets thicker, the radiation detected will be ..... [1]

(ii) The radioactive source has a half life of 25 years.
After 25 years, the radiation emitted by the source will be ..... [1]

7

5. The circuit below is used to investigate how the resistance of a lamp changes at different voltages.



(a) Complete the following sentences by underlining the correct words in the brackets. [2]

(i) The voltmeter is used to measure the (current through / voltage across / resistance of) the lamp.

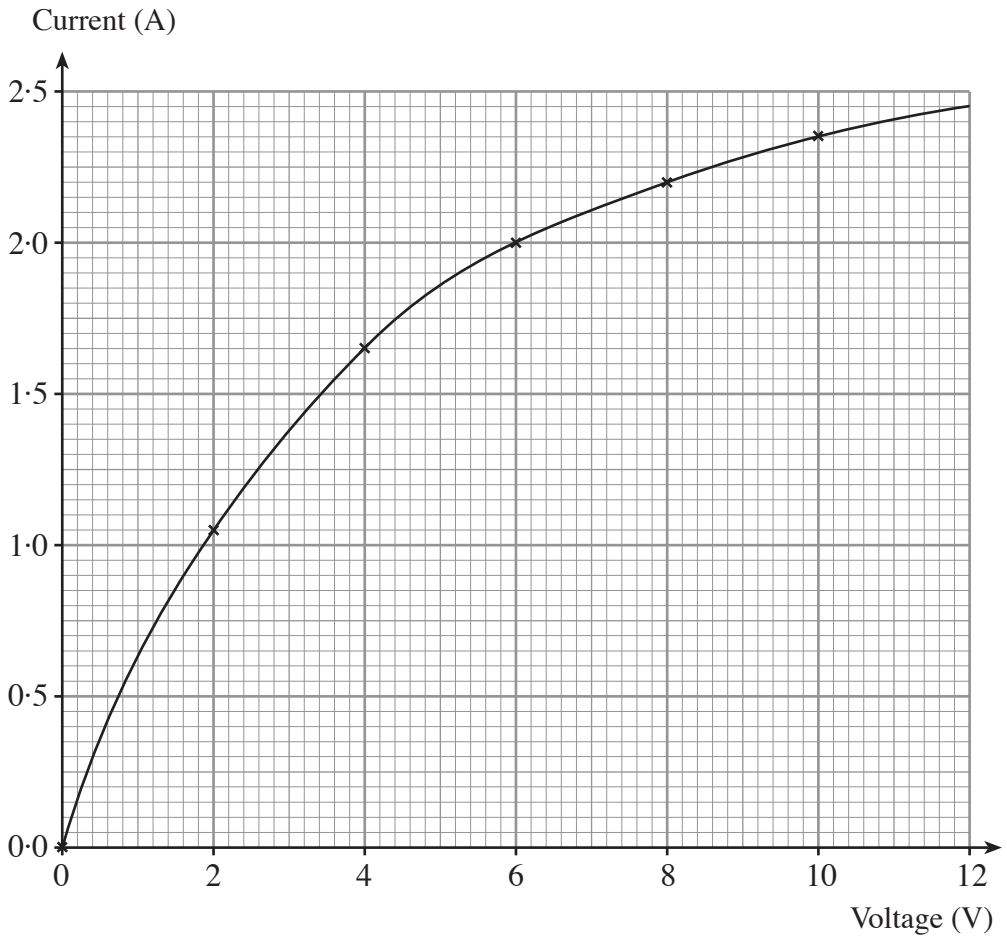
(ii) The ammeter is used to measure the (current through / voltage across / resistance of) the lamp.

(b) State the purpose of the variable resistor in the circuit. [1]

.....

Examiner only

(c) At the end of the investigation, the following graph is plotted.



(i) Use the graph to find the current when the voltage is 6 V. [1]

Current = ... A

(ii) Use the equation

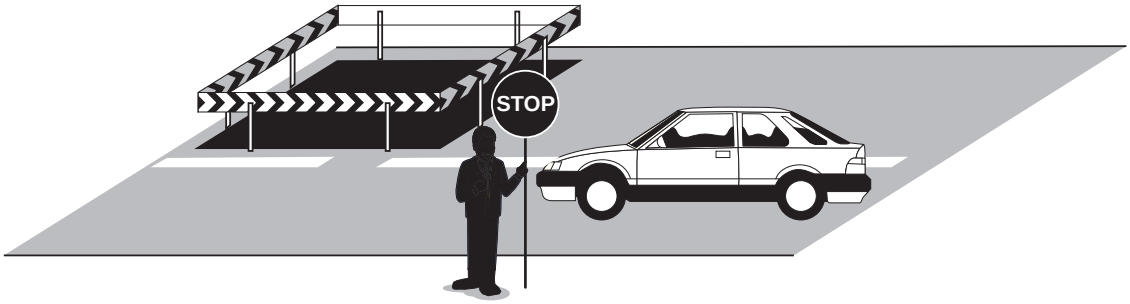
$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

to find the resistance of the lamp at 6 V. [1]

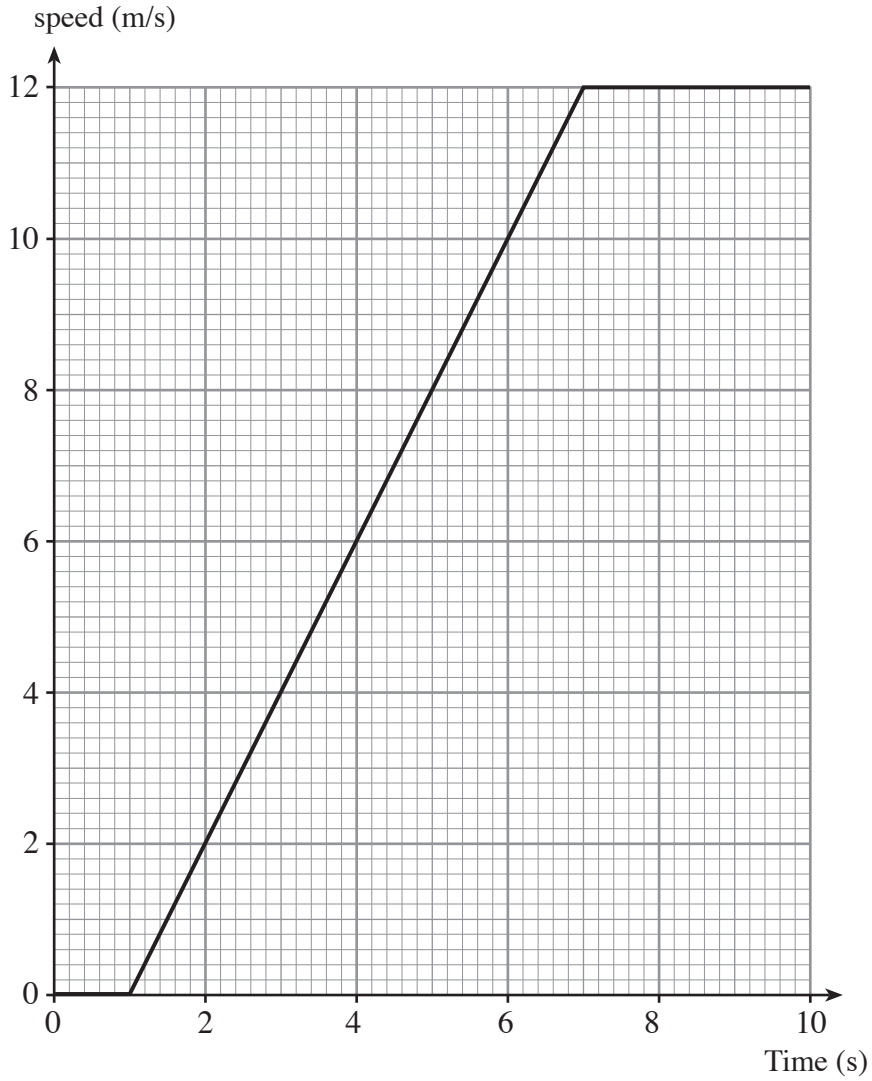
Resistance = ... Ω

5

6. A car is stopped at road works.



The sign changes to **GO** and the car moves again.
The graph shows how the speed of the car changes after the sign shows GO.



(a) The driver does not start to move the car straightaway after the sign changes to GO. This is because of the **reaction time** of the driver.

(i) Use the graph to find the reaction time of the driver. [1]

Reaction time = ... s

(ii) Which of the following will affect a driver's reaction time? [2]
Circle your choices.

car brakes **alcohol** **tiredness** **wet road**

(b) Use the graph to answer the following questions.

(i) Find the maximum speed of the car. [1]

Maximum speed = ... m/s

(ii) Find the change in speed of the car. [1]

Change of speed = ... m/s

(iii) Find for how long the car was speeding up. [1]

Speeding up time = ... s

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7. Read the following information about radon and answer the questions that follow.

Radon is a natural radioactive gas that comes mainly from the ground.

Radon is produced when radium decays.

Radon and radium emit alpha particles.

Radon gas enters houses and can cause a dangerous rise in radiation levels.

Scientists measure radon levels in units called becquerel per cubic metre (Bq/m^3).

The average radon level in UK homes is 20 Bq/m^3.

The Government recommends that, if your indoor radon level reaches the **Action Level**, which is ten times the average, you should take steps to reduce it.

(a) (i) How does radon gas get into homes? [1]

.....

.....

(ii) Explain why breathing in radon can be harmful. [2]

.....

.....

.....

(b) Calculate the **Action Level**. [2]

Action level = ... Bq/m^3

(c) State **two** ways that the radon level in homes can be reduced. [2]

1. .....

.....

2. .....

.....

7

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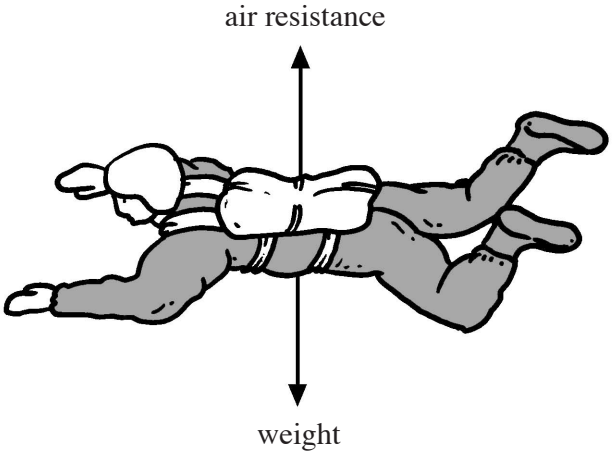
8. The diagram shows the forces acting on a skydiver falling through the air.



(a) (i) As the skydiver falls, the air resistance increases.
Give a reason why. [1]

.....

.....

(ii) State what happens to the weight as the skydiver falls. [1]

.....

.....

(b) (i) Describe the motion of the skydiver when the air resistance is smaller than the weight. [1]

.....

.....

(ii) Describe the motion of the skydiver when the air resistance is equal to the weight. [1]

.....

.....

(c) After jumping from an aeroplane, the skydiver's speed increases to 35 m/s after 7 s.
Write down an equation, as it appears on page 2, and then use it to calculate the acceleration of the skydiver.

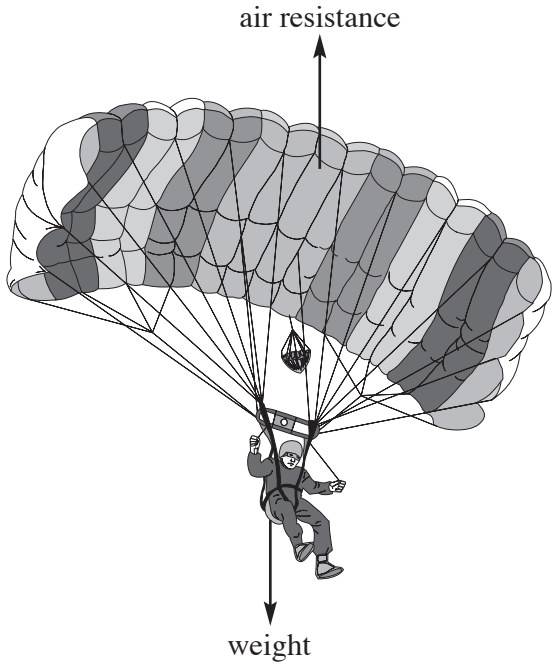
Equation: .....

..... [1]

Calculation: [1]

Acceleration = ... m/s^2

(d) The diagram shows the skydiver just after the parachute opens.



(i) State what happens to the air resistance as the parachute opens. [1]

.....

.....

(ii) Describe how the motion of the skydiver changes as the parachute opens. [1]

.....

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