

Surname	Initial(s)
Signature	

Paper Reference(s)

**5010 5046**

# Edexcel GCSE

**Science (5010)**

**Physics (5046)**

P1b – Topics 11 and 12

**Foundation and Higher Tier**

Friday 12 November 2010 – Afternoon

Time: 20 minutes

**Materials required for examination**

Multiple Choice Answer Sheet  
HB pencil, eraser and calculator

**Items included with question papers**

Nil

**Instructions to Candidates**

Use an HB pencil. Do not open this booklet until you are told to do so.  
Mark your answers on the separate answer sheet.

**Foundation tier candidates:** answer questions 1 – 24.

**Higher tier candidates:** answer questions 17 – 40.

All candidates are to answer questions 17 – 24.

**Before the test begins:**

Check that the answer sheet is for the correct test and that it contains your candidate details.

**How to answer the test:**

For each question, choose the right answer, A, B, C or D  
and mark it in HB pencil on the answer sheet.

For example, the answer C would be marked as shown.



Mark only **one** answer for each question. If you change your mind about an answer, rub out the first mark **thoroughly**, then mark your new answer.

Do any necessary calculations and rough work in this booklet. You may use a calculator if you wish.

You must not take this booklet or the answer sheet out of the examination room.

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Questions 1 to 16 must be answered by Foundation tier candidates only.  
Higher tier candidates start at question 17.

**Waves in hospitals**

1. This picture shows a broken bone.



Pictures of broken bones are produced using

- A X-rays
  - B ultraviolet waves
  - C beta rays
  - D microwaves
2. This picture is a scan of an unborn baby.



The unborn baby is scanned using

- A microwaves
- B ultrasound waves
- C infrared waves
- D ultraviolet waves

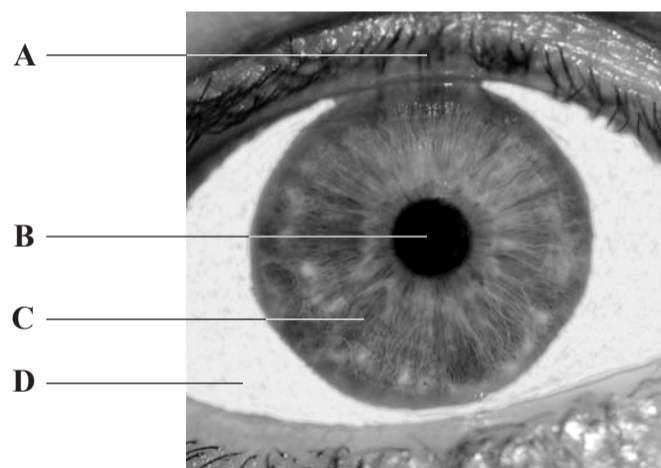
3. Gamma rays are used in hospitals to
- A take temperatures
  - B repair muscle damage
  - C heal wounds
  - D kill cancer cells

**Identification**

4. The photograph shows a machine used to identify a person.  
The machine scans the eye.



Which part at the front of the eye is used for identification?



5. This bank note has a strip which glows in ultraviolet light.



The strip helps to

- A kill bacteria on the note
  - B make the note last longer
  - C detect forgeries
  - D protect people from ultraviolet light
6. Fire-fighters rescue people from smoke filled rooms.  
The fire-fighters use thermal imaging cameras to help them.

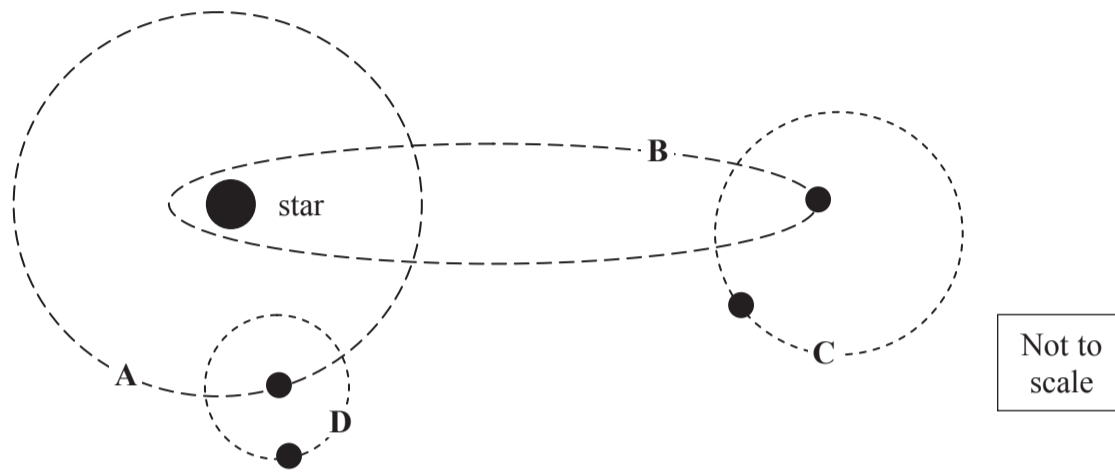


The image in the camera is produced because

- A people absorb ultraviolet radiation
- B people emit ultraviolet radiation
- C people absorb infrared radiation
- D people emit infrared radiation

**Stars and planets**

7. Which of these shows the orbit of a planet?

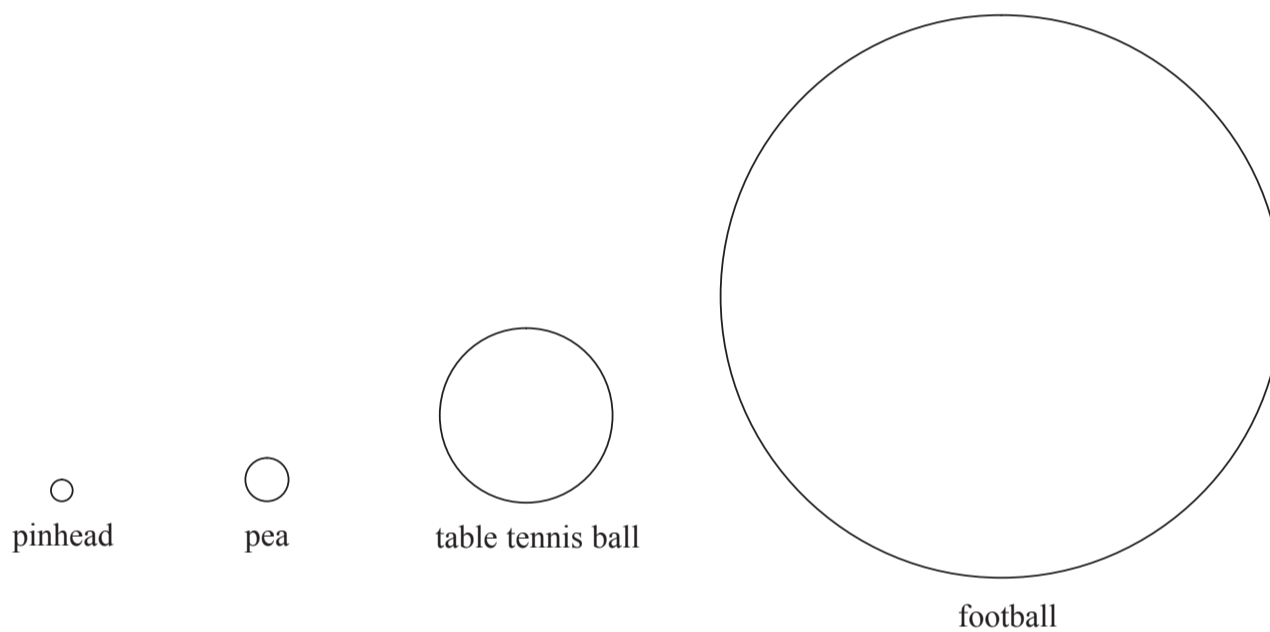


8. In its next stage of development, our Sun will change from a main sequence star to
- A** a white dwarf
  - B** a red dwarf
  - C** a red giant
  - D** a white giant

9. Some students found this data about the Solar System.

object	diameter (km)
Sun	1 400 000
Mercury	4 900
Earth	13 000
Jupiter	140 000

The students make a scale model of the Sun and these three planets. They use these objects to represent the Sun and planets



Which row of the table shows the best choice of objects for the model?

	Sun	Mercury	Earth	Jupiter
A	football	pea	table tennis ball	pinhead
B	football	pea	pinhead	table tennis ball
C	football	pinhead	pea	table tennis ball
D	football	table tennis ball	pea	pinhead

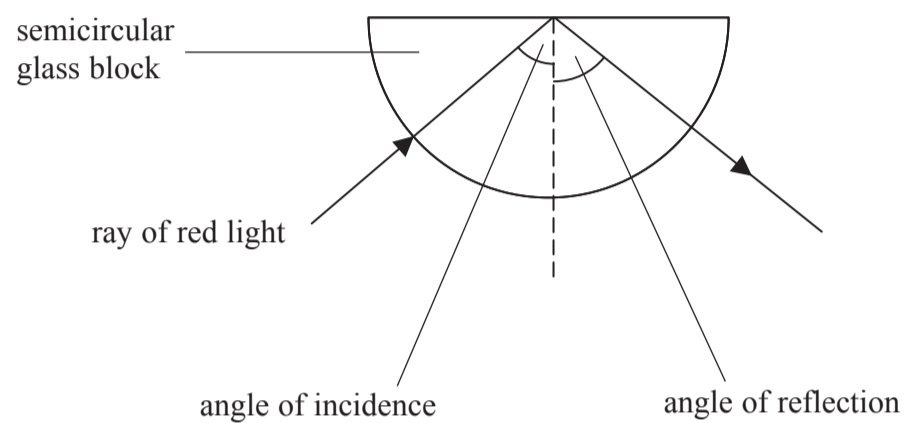
10. Scientists think the Big Bang happened when

- A the Sun began to shine
- B two galaxies collided
- C a black hole became a supernova
- D the Universe began

### Total internal reflection

Use this information to answer questions 11 to 13.

Some students use this equipment to investigate total internal reflection in glass.



Here are some of their results.

angle of incidence	angles of reflection		
	1st try	2nd try	3rd try
50°	48°	48°	51°
60°	58°	61°	53°
70°	68°	70°	69°
80°	79°	78°	82°

Using these results:

11. When the angle of incidence is 50° the average angle of reflection is

- A 48°
- B 49°
- C 50°
- D 147°

12. One of the results for the 3rd try is anomalous.  
The anomalous result is

- A 51°
- B 53°
- C 69°
- D 82°

13. Why did the students take three results at each angle of incidence?

- A to make the experiment more reliable
- B to get one accurate result
- C to get the same results
- D to make it a fair test

**Mass and weight**

14. An object on Earth has a mass of 1 kg.  
Which row of the table is correct for this object on the Moon?

	mass on the Moon	weight on the Moon
A	same as on Earth	same as on Earth
B	same as on Earth	less than on Earth
C	less than on Earth	less than on Earth
D	less than on Earth	same as on Earth

15. Some students discuss the effects of long space flights.

Being weightless will cause muscles to become weaker.

Amy

The heart will grow stronger because it can pump the blood more easily.

Bella

Being weightless will cause the bones to grow stronger.

Carl

Higher radiation doses will increase the risk of cancer.

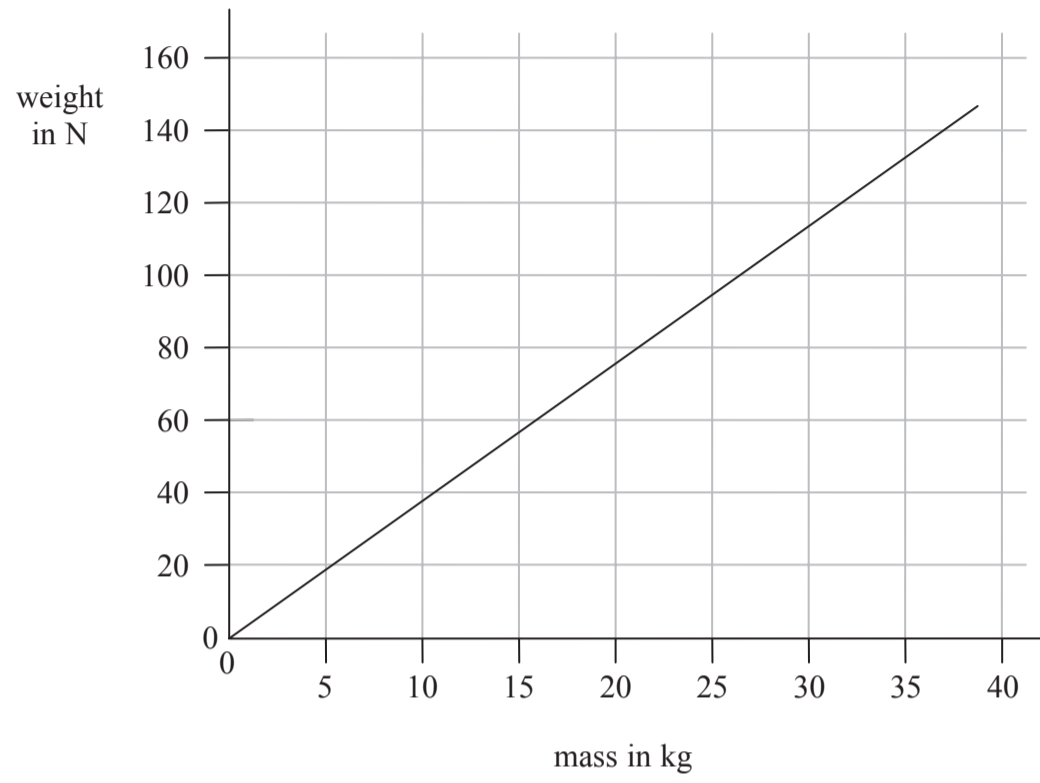
Dave

Which **two** students are correct?

- A Amy and Bella
- B Bella and Carl
- C Amy and Dave
- D Carl and Dave



16. The graph shows the relationship between mass and weight for objects on Mars.



On Mars, an object of mass 20 kg weighs about

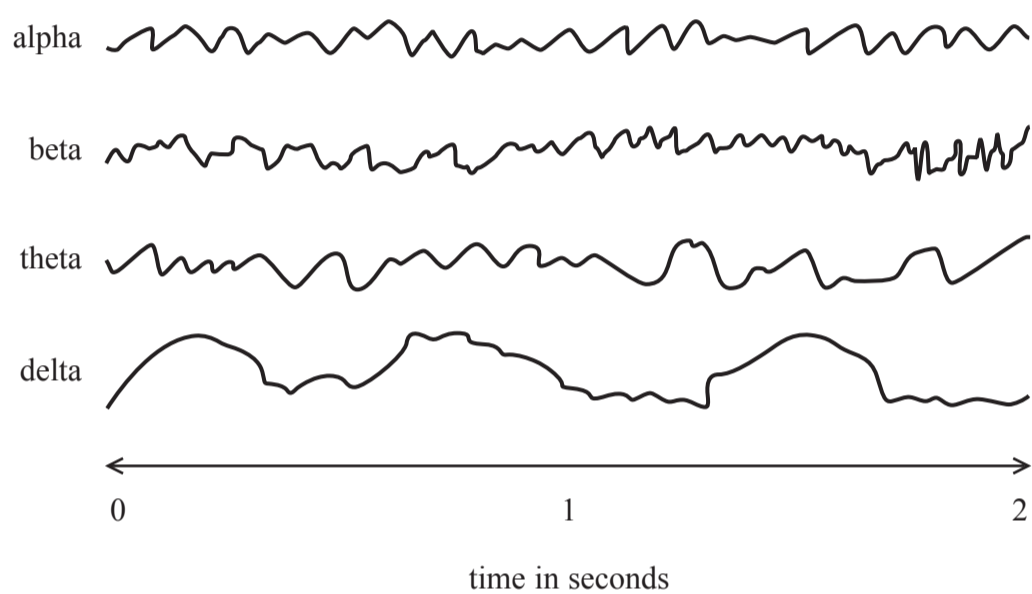
- A 68 kg
- B 68 N
- C 75 kg
- D 75 N

Higher tier candidates start at question 17 and answer questions 17 to 40.  
Questions 17 to 24 must be answered by all candidates: Foundation tier and Higher tier

### Waves

Use this information to answer questions 17 and 18.

The diagram shows four types of brain wave.



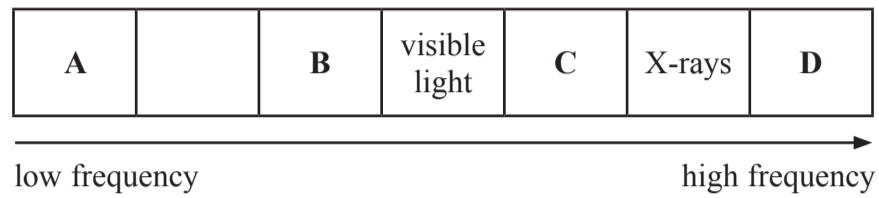
17. The brain wave with the biggest amplitude is

- A alpha
- B beta
- C theta
- D delta

18. The brain wave with the lowest frequency is

- A alpha
- B beta
- C theta
- D delta

19. The chart shows the electromagnetic spectrum.  
The sections for visible light and X-rays have been labelled.



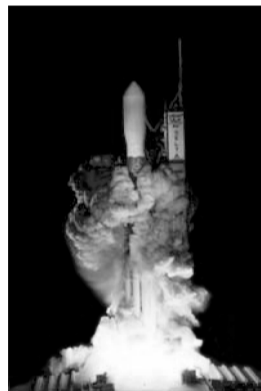
Where should the infrared label be placed?

20. Which row of the table is correct?

	ultrasound waves are	ultraviolet waves are
<b>A</b>	longitudinal	transverse
<b>B</b>	longitudinal	longitudinal
<b>C</b>	transverse	transverse
<b>D</b>	transverse	longitudinal

### Discovering new planets

The Kepler space telescope was launched in 2009.  
The photograph shows the launch of the rocket.



21. The gases are pushed downwards by the rocket engine with a force of 478 kN.  
Which row of the table is correct for the force of the gases on the rocket engine?

	size of force on rocket engine	direction of force on rocket engine
<b>A</b>	equal to 478 kN	downwards
<b>B</b>	equal to 478 kN	upwards
<b>C</b>	greater than 478 kN	downwards
<b>D</b>	greater than 478 kN	upwards

22.

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

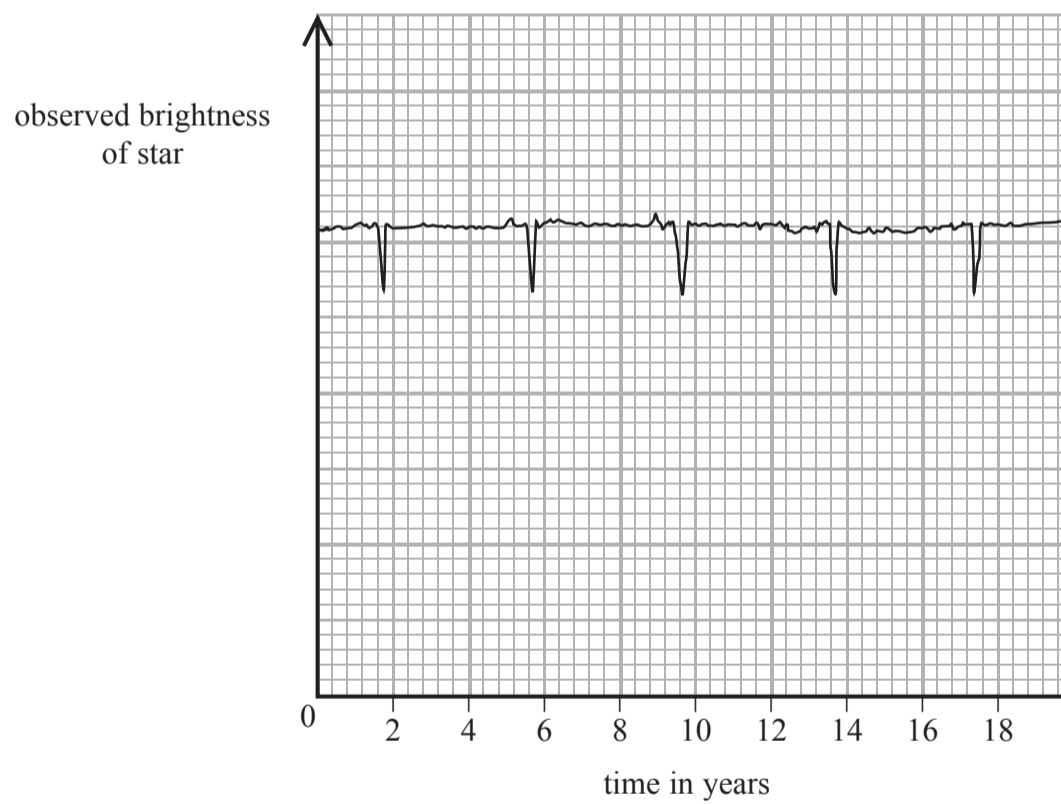
In space, when the rocket's mass is 2000 kg, its acceleration is  $0.25 \text{ m/s}^2$ .  
The force needed to produce this acceleration is

- A 500 N
- B 5 000 N
- C 8 000 N
- D 80 000 N

*Use this information to answer questions 23 and 24.*

The Kepler telescope is designed to search for new planets.  
When a planet passes in front of a star, the telescope detects a tiny decrease in brightness.

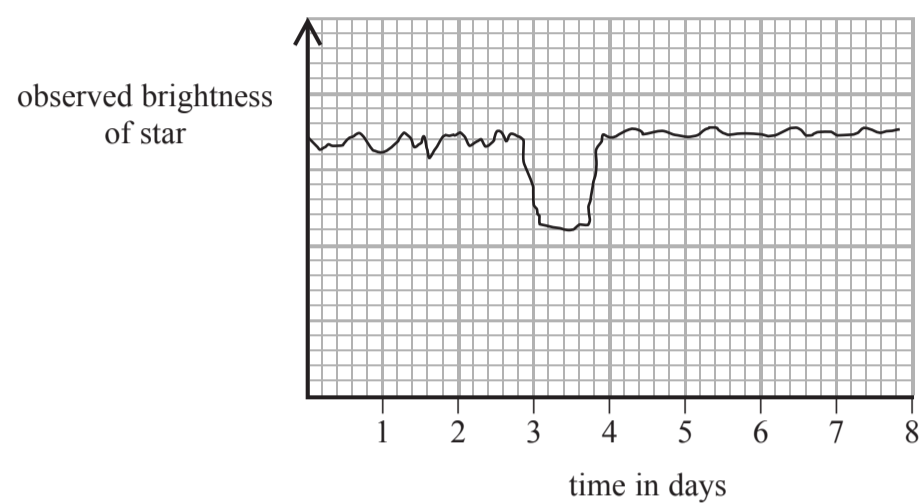
23. A planet is passing between its star and the telescope.  
The graph shows what the Kepler telescope could find.



Approximately how many years does it take the planet to orbit its star?

- A 0.1 years
- B 2 years
- C 4 years
- D 16 years

24. The graph below shows how the observed brightness of another star varies over several days as a planet passes between the star and the telescope.



Which of these is shown by the graph?

- A the planet takes about a day to pass in front of the star
- B the planet spins on its axis once every day
- C the star cannot be seen when the planet passes in front of it
- D the planet takes one day to orbit the star

**TOTAL FOR FOUNDATION TIER PAPER: 24 MARKS**

**Foundation tier candidates do not answer any more questions after question 24.**

**Questions 25 to 40 must be answered by Higher tier candidates only.  
Foundation tier candidates do not answer questions 25 to 40.**

25. The gravitational field strength of a planet should be measured in

- A m/s
- B N/kg
- C kg/N
- D  $(\text{m/s})^2$

26. Which row of the table is correct for interplanetary space?

	temperature ( $^{\circ}\text{C}$ )	the atmosphere is the same as
A	0	at the top of Mount Everest
B	0	on the Moon
C	-270	on the Moon
D	-270	at the top of Mount Everest

#### Waves and space

27. Which row of the table is correct for electromagnetic waves travelling in a vacuum?

	speed of radio waves ( $\times 10^6$ m/s)	speed of ultraviolet waves ( $\times 10^6$ m/s)	speed of gamma rays ( $\times 10^6$ m/s)
A	300	300	300
B	280	300	320
C	320	300	280
D	300	280	320

28. This bank note has a strip which glows in ultraviolet light.



Which row of the table explains why the strip glows?

	ultraviolet light is	visible light is
<b>A</b>	absorbed by the strip	absorbed by the strip
<b>B</b>	emitted by the strip	absorbed by the strip
<b>C</b>	absorbed by the strip	emitted by the strip
<b>D</b>	emitted by the strip	emitted by the strip

29. Which of these shows the correct order of some stages in the evolution of a star like our Sun?

- A** nebula → main sequence → red giant → white dwarf  
**B** nebula → main sequence → red giant → supernova  
**C** white dwarf → red giant → main sequence → supernova  
**D** white dwarf → main sequence → supernova → black hole

30. People can see visible light from stars and asteroids.  
Which row of the table is correct for this light?

	the light from stars is	the light from asteroids is
<b>A</b>	emitted	emitted
<b>B</b>	reflected	emitted
<b>C</b>	emitted	reflected
<b>D</b>	reflected	reflected

31. Two students discuss advantages of digital signals compared to analogue signals.

Digital signals can carry more information than analogue signals.

Marc

Digital signals are less affected by noise.

Rosa

Who is correct?

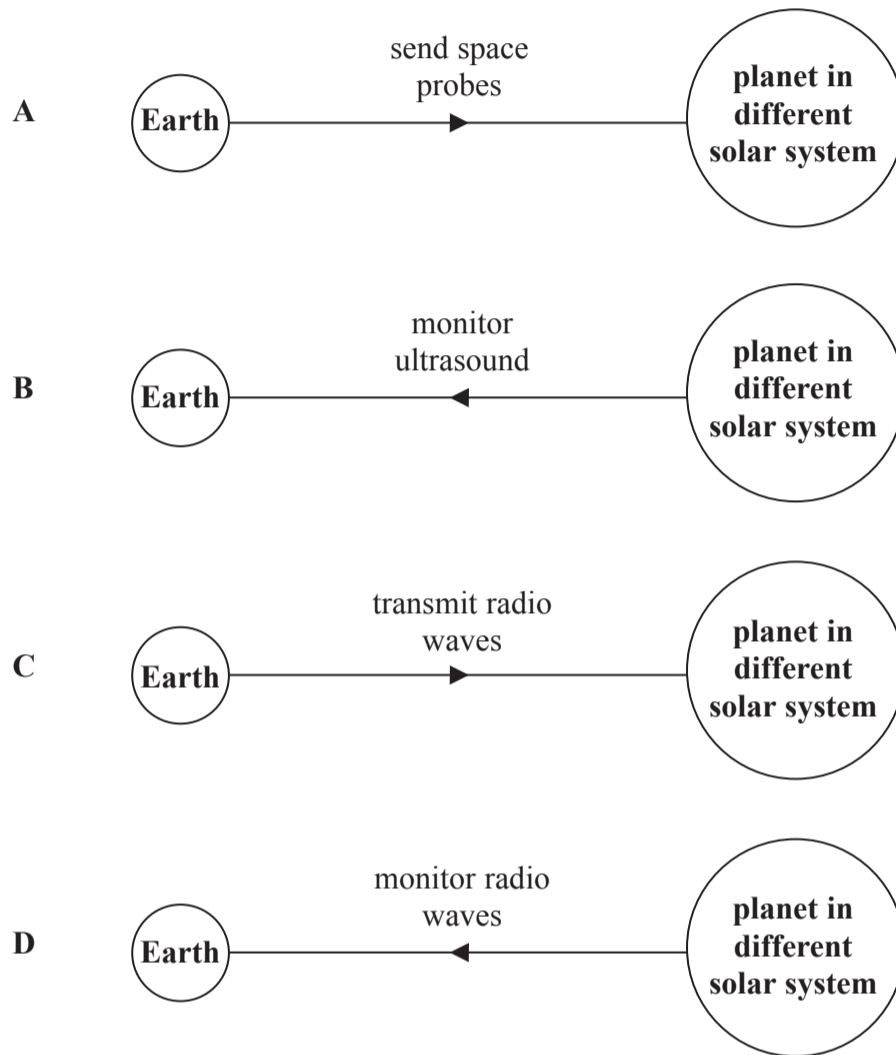
- A Marc only
  - B Rosa only
  - C both Marc and Rosa
  - D neither
32. Scientists think that Saturn is too cold for life to have developed there. Scientists have found a new planet orbiting a distant star.

Which row of the table shows the conditions that make it **least** likely for life to have developed on the new planet?

	the star gives out	the radius of the planet's orbit is
A	half the energy of our Sun	larger than Saturn's
B	half the energy of our Sun	equal to Saturn's
C	twice the energy of our Sun	larger than Saturn's
D	twice the energy of our Sun	equal to Saturn's



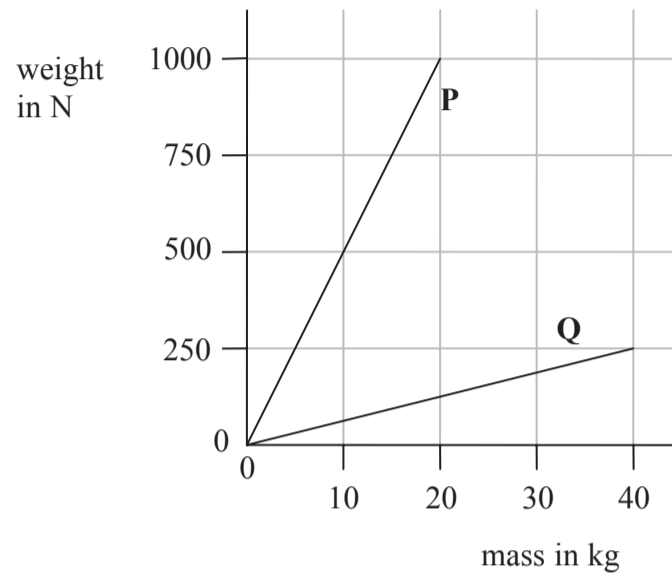
33. Scientists are trying to find evidence for life on planets other than Earth. Which of these best shows the method used by the Search for Extraterrestrial Intelligence (SETI)?



34. Red shift gives evidence that the Universe is

- A becoming hotter
- B becoming colder
- C expanding
- D contracting

35. The graph shows the relationship between mass and weight on planets **P** and **Q**.



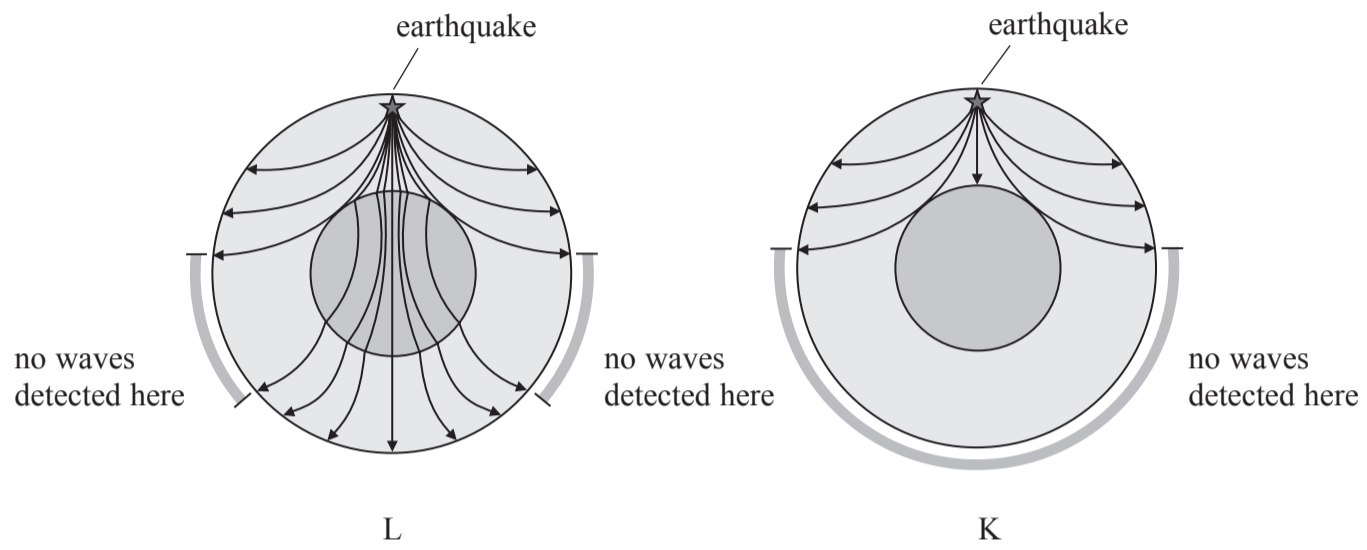
Which statement is correct for gravitational field strength on planets **P** and **Q**?

- A** gravitational field strength on planet **P** doubles every 10 kg
  - B** gravitational field strength on planet **P** increases four times for every 10 kg
  - C** gravitational field strength on planet **P** is four times that on planet **Q**
  - D** gravitational field strength on planet **P** is eight times that on planet **Q**
36. In May 2009, the Planck space platform was launched.  
Two of its major objectives are
- to measure cosmic microwave background radiation
  - to determine the amount of 'dark matter' in the Universe

Which row of the table is correct?

	<b>cosmic microwave background radiation provides evidence for</b>	<b>scientists think that there is dark matter because of</b>
<b>A</b>	stellar evolution	its strong gravitational pull on normal matter
<b>B</b>	the Big Bang	its strong gravitational pull on normal matter
<b>C</b>	stellar evolution	the red shift of microwave background radiation
<b>D</b>	the Big Bang	the red shift of microwave background radiation

37. Scientists use seismic waves to explain the structure of the Earth.  
 Diagram L shows how one type of wave travels through the Earth.  
 Diagram K shows how a different type of wave travels through the Earth.



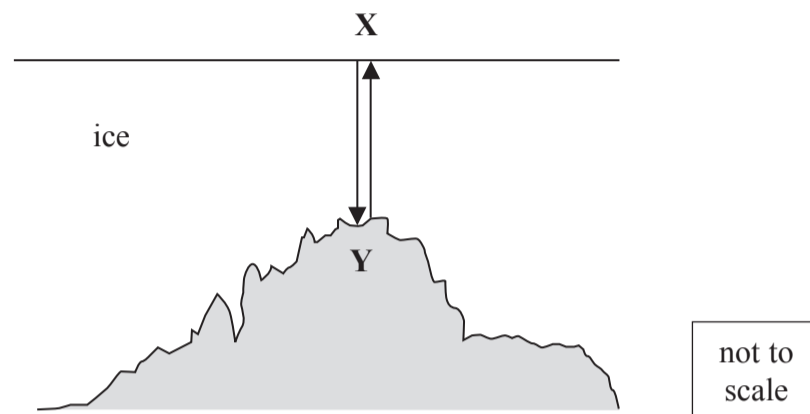
Which row of the table is correct?

	longitudinal P-waves are shown in diagram	transverse S-waves are shown in diagram
<b>A</b>	L	L
<b>B</b>	L	K
<b>C</b>	K	L
<b>D</b>	K	K

38.

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

Scientists have discovered mountains under the ice near the South Pole. They use sound waves to measure the thickness of the ice.



The sound waves travel vertically between **X** and **Y**.  
The average speed of sound waves in ice is 3000 m/s.  
The time needed for the sound waves to reach point **Y** and return to point **X** is 2 seconds.

The thickness of the ice between **X** and **Y** is

- A** 1 500 m
- B** 3 000 m
- C** 6 000 m
- D** 12 000 m

39.

$$\text{speed} = \text{frequency} \times \text{wavelength}$$

The sound waves in the ice have a frequency of 1.5 kHz.  
The average speed of sound in ice is 3000 m/s.

What is the average wavelength of the sound waves in ice?

- A** 0.0005 m
- B** 2 m
- C** 2 000 m
- D** 4 500 000 m

40. Two students discuss the dangers of electromagnetic waves.

Infrared radiation causes cells in the body to mutate.

Peter

The energy of electromagnetic waves increases with increasing wavelength.

Rick

Who is correct?

- A Peter only
- B Rick only
- C both Peter and Rick
- D neither

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**TOTAL FOR HIGHER TIER PAPER: 24 MARKS**

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