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 21 November 2008 – Morning

Time: 20 minutes

Materials required for examination	**Items included with question papers**
Multiple Choice Answer Sheet HB pencil, eraser and calculator	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.

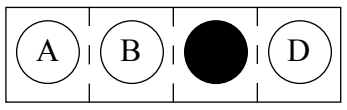
Foundation tier candidates: answer questions 1 – 24.
Higher tier candidates: answer questions 17 – 40.
All candidates are to answer questions 17 – 24.

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.

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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 action

Many of our activities depend on waves.
There are many different waves.

1. Mobile phones use

A ultrasound waves
B ultraviolet waves
C microwaves
D gamma waves

2. Which of these is **most likely** to cause human cells to mutate?

A microwaves
B radio waves
C infrared waves
D gamma waves

3. Ultraviolet waves are used to

A detect forged bank notes
B scan pregnant women
C cook food
D communicate with satellites

4. In optical fibres light is

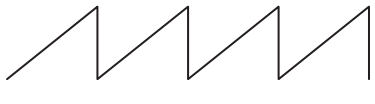
A totally externally reflected
B totally externally refracted
C totally internally reflected
D totally internally refracted

5. Sonar uses

A ultraviolet waves
B ultrasound waves
C infrared waves
D microwaves

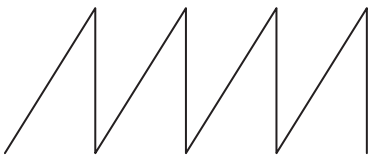
6. This diagram shows a wave.

Which of these waves has the same wavelength but a larger amplitude?



A

B



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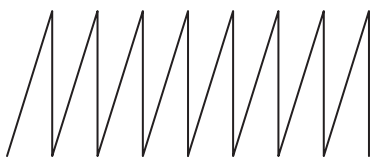


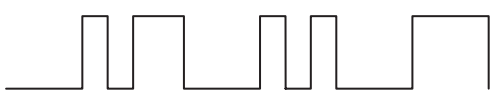
D

7. Which of these can **never** be a transverse wave?

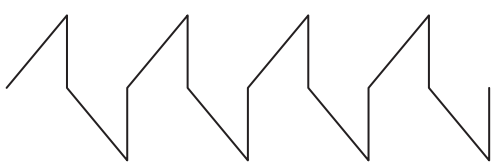
A an ultrasound wave
B an ultraviolet wave
C an earthquake wave
D a water wave

8. Which of these shows a digital signal?

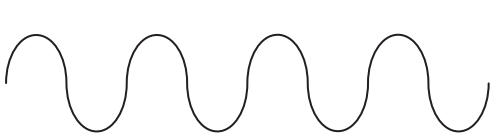
A



B



C



D

Journey into space

Astronauts may soon travel further away from Earth than ever before.

9. Halfway between the Earth and the Moon, the conditions in space are different from those on Earth.
Which of these is true?

A The force of gravity is zero and the pressure is lower than on the Earth's surface.
B The force of gravity is smaller and the pressure is higher than on the Earth's surface.
C The force of gravity is smaller and the pressure is lower than on the Earth's surface.
D The force of gravity is zero and the pressure is higher than on the Earth's surface.

10. A journey to another planet will take a long time.
The astronauts will have problems with their heart muscles.
One way to help prevent this is to

A rest for five minutes every hour
B breathe more slowly
C use an exercise machine
D take calcium tablets

11. Which evidence would support the claim that there may have been life on Mars?

A The average temperature on Mars is much lower than on Earth.
B Photographs show that there may have been water on Mars.
C Photographs show that there may have been volcanoes on Mars.
D Carbon dioxide is the most common gas in the atmosphere of Mars.

12. Scientists have **not** yet tried to find information about other planets by

A looking for patterns in radio waves
B sending astronauts to conduct experiments on a planet's surface
C sending probes to conduct experiments on a planet's surface
D looking through powerful telescopes

13. Which row of the table is correct for the orbits of a comet and a planet?

	a comet orbits the	**a planet orbits the**
A	Earth	Sun
B	Earth	Earth
C	Sun	Sun
D	Sun	Earth

14. A student thinks about the mass of an object.
Which of these statements is true?

A The mass of an object is zero on Mars and on the Moon.
B The mass of an object on Mars is less than its mass on the Moon.
C The mass of an object on Mars is more than its mass on Moon.
D The mass of an object is the same on Mars as it is on the Moon.

15. Our Sun is likely to end its life as

A a black dwarf
B a black hole
C a blue dwarf
D a blue giant

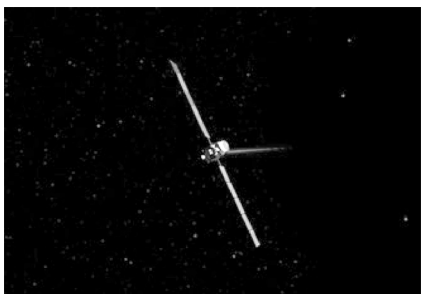
16. Which of these shows the objects in the correct order of size ?

	largest ⟶		**smallest**
A	Universe	galaxy	star
B	Universe	star	galaxy
C	galaxy	Universe	star
D	galaxy	star	Universe

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.

Dawn

A space probe called Dawn has recently been launched to investigate two asteroids.



17. An asteroid orbits

A Jupiter
B the Sun
C the galaxy
D the Solar System

18. Signals are sent to Dawn to control it.
The signals could be sent through space from a satellite.
These signals would

A take the same time, whatever type of electromagnetic wave is used
B arrive sooner if infrared waves are used instead of X-rays
C take more time if microwaves are used instead of visible waves
D arrive sooner if ultraviolet waves are used instead of radio waves

Use this information to answer questions 19 and 20.

Dawn will travel 4 800 000 000 km in 8 years.

19.

speed = distance ÷ time

Dawn's average speed in km per year will be

A 384 000 000
B 600 000 000
C 38 400 000 000
D 60 000 000 000

20. When Dawn arrives near an asteroid, it will be difficult to steer by remote control from Earth.
This difficulty is mainly caused by

A the time delay of signals travelling to Dawn from Earth
B changes in the distance between the asteroid and the Sun
C the reduced gravitational pull of the Earth
D the small size of the asteroid which makes Dawn weightless

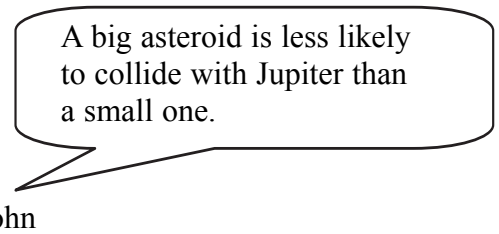
21. The signals sent to Dawn will be digital.
Which row of the table correctly compares digital signals with analogue signals?

	digital signals	**analogue signals**
A	travel faster than analogue signals	are less affected by noise
B	travel faster than analogue signals	are more affected by noise
C	travel at the same speed as analogue signals	are more affected by noise
D	travel at the same speed as analogue signals	are less affected by noise

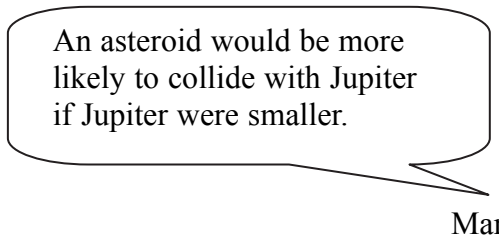
22. The force of gravity on the surface of an asteroid is

A zero
B more than on the surface of the Earth
C less than on the surface of the Earth
D the same as on the surface of the Earth

23. Two students, John and Mary, discuss the chance of an asteroid colliding with the planet Jupiter.



John



Mary

Who is correct?

A John only
B Mary only
C both John and Mary
D neither

24. Near Jupiter, an object of mass 10 kg weighs 200 N.
The gravitational field strength, in N/kg, at this point is

A 200 + 10
B 200 – 10
C 200 × 10
D 200 ÷ 10

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 Dawn space probe uses an ion drive.
It works like a rocket motor.
Instead of gases, a stream of charged particles is pushed backwards from the motor.
When the drive is working, Dawn accelerates because

A Dawn has no mass
B the charged particles pull on Dawn
C the charged particles push on each other
D Dawn is pushed forward as the charged particles are pushed backwards

26.

force = mass × acceleration

The space probe has a mass of 1200 kg.
Out in space, it accelerates at 0.00008 m/s^2.
The force producing this acceleration is

A 0.096 kg
B 0.096 N
C 9600 kg
D 9600 N

27. Astronomers on Earth study asteroids using telescopes.
The telescopes scan the radiation

A emitted by the asteroids
B reflected by the asteroids
C refracted by the asteroids
D transmitted by the asteroids

28. The waves which travel across space to Dawn must be

A transverse
B longitudinal
C fluorescent
D ultrasound

29.

speed = frequency × wavelength

Communications with Dawn may be at a frequency of 1 200 000 000 (or 1.2×10^9) Hz.
The speed of the waves is 300 000 000 (or 3.0×10^8) m/s.
The wavelength, in m, is

A 0.040 (or 4.0×10^{-2})
B 0.25 (or 2.5×10^{-1})
C 4.0 (or 4.0×10^0)
D 360 000 000 000 000 000 (or 3.6×10^{17})

Earthquakes

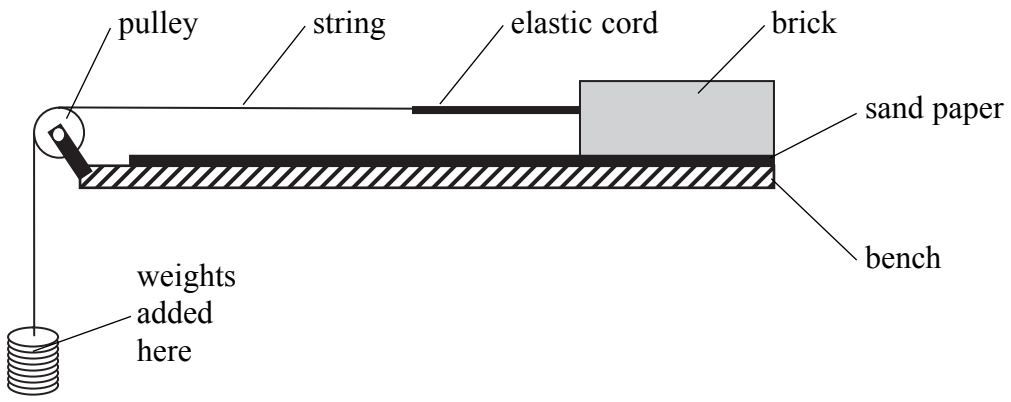
John was studying earthquakes.

30. Scientists use earthquake waves

A to help release large amounts of useful energy
B to help measure the diameter of the Earth
C to help explain the structure of the Earth
D to help prove that the Earth's core is solid

Use this information to answer questions 31 and 32.

Earthquakes happen when pieces of the Earth's crust slide against each other.
John wanted to investigate how sliding works.
The diagram shows an experiment he tried.



The weights are added carefully.
Suddenly the brick jerks to the left.
When a second brick is placed on top of the first, John needs to add more weights before the bricks move.

31. John and his friends had watched this initial experiment. John's friends made these statements.

I think John should use the same brick and elastic cord each time.

A

Adding too many weights could break the elastic cord.

B

To move more bricks more weights have to be added.

C

Removing the sandpaper will allow the brick to slide more easily.

D

Who has drawn a conclusion?

32. John repeats the experiment several times with a single brick.
He finds that he has to add different numbers of weights to make the brick slide each time.
This experimental model of an earthquake suggests why scientists **cannot**

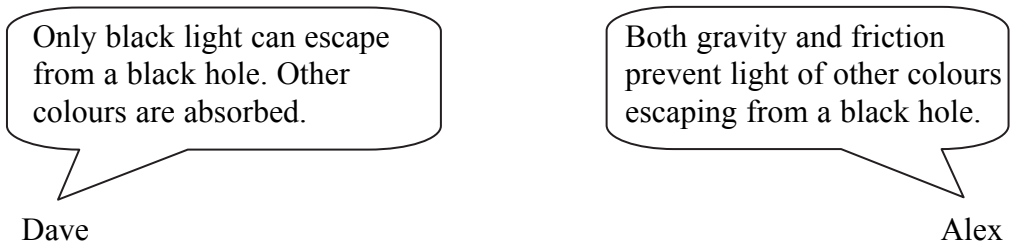
A measure the size of an earthquake
B predict when an earthquake will happen
C detect transverse waves from earthquakes
D detect exactly where an earthquake has happened

33. Longitudinal waves from an earthquake follow curved paths inside the Earth.
This shows that longitudinal waves

A travel at different speeds at different depths
B are repelled by the Earth's core
C arrive before transverse waves
D pass through the Earth's core

Space – fact and fiction

34. Dave and Alex talk about black holes.



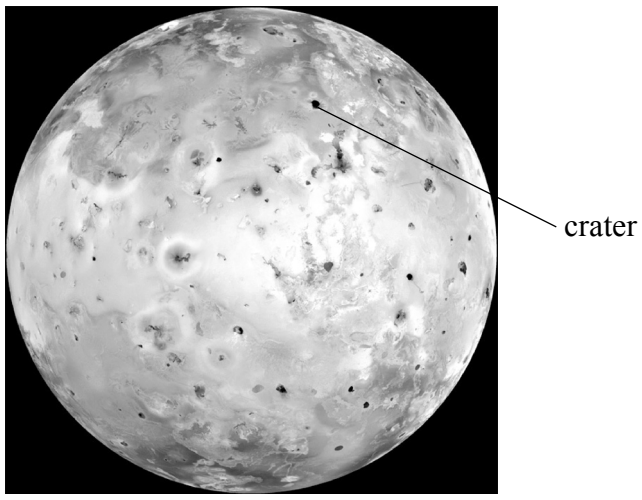
Who is correct?

A Dave only
B Alex only
C both Dave and Alex
D neither

35. Humans in space can suffer from the effects of harmful waves.
Which row of the table is correct for the most dangerous waves?

	frequency	**energy**
A	lowest	lowest
B	highest	lowest
C	lowest	highest
D	highest	highest

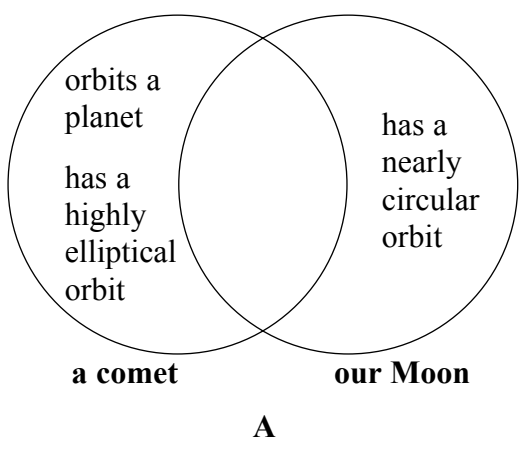
36. John looks at a photograph of a moon.
He sees that there are some craters on it.



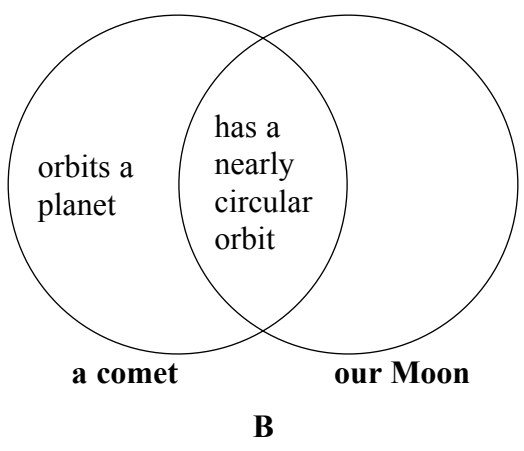
Which of these is a correct conclusion from studying the photograph?

A The craters are caused by meteorites.
B The surface of this moon has craters all over it.
C At least one half of this moon's surface has craters.
D All moons have craters on their surface.

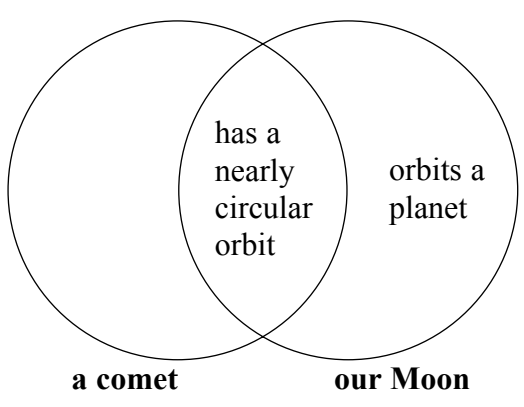
37. Which of these charts correctly shows information about a comet and our Moon?



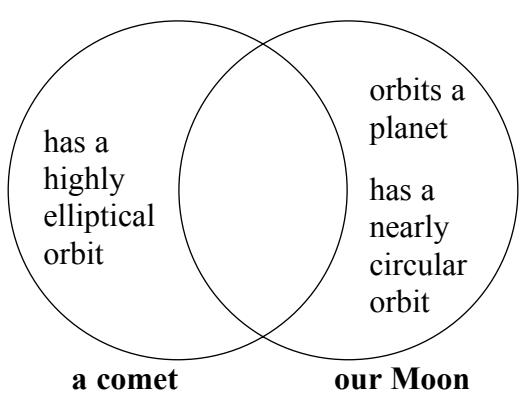
A



B



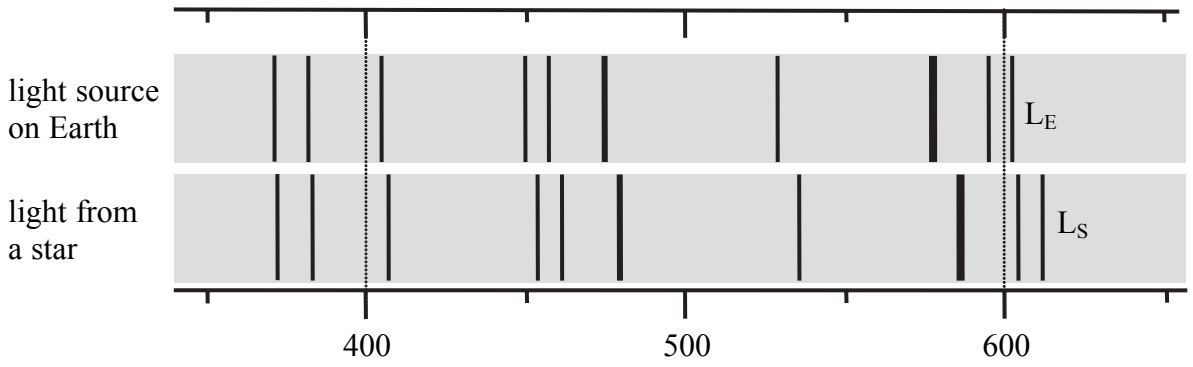
C



D

Light from Space

The diagram compares the line spectra from a light source on Earth and from a star.
Note: 1 nanometre is 1×10^{-9} m



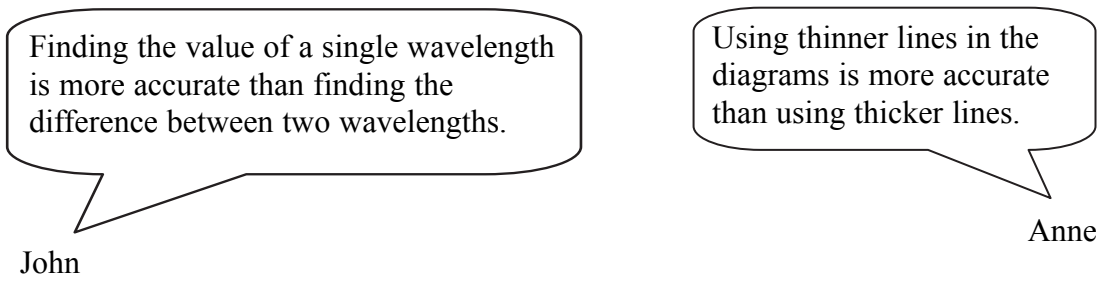
38. The difference in wavelength between line marked L_E from the source on Earth and L_S from the star is about

A 9 nanometres
B 604 nanometres
C 619 nanometres
D 4 millimetres

39. Measurements of this type provide evidence that

A the star will end up as a black hole
B the star is moving away from Earth
C the Universe will continue to expand
D there is background microwave radiation

40. John and Anne discuss the accuracy of measurements taken from the line spectra diagrams.



Who is correct?

A John only
B Anne only
C both John and Anne
D neither

TOTAL FOR HIGHER TIER PAPER: 24 MARKS

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