

Red Shift and Big Bang MCQS

Q:1 Light from every star, in every distant galaxy which has been observed, shows a red-shift. 8A
Why has the feature been given this name?

- 1) Blue light has a longer wavelength than red light.
- 2) Red light has a higher frequency than blue light.
- 3) Red light travels at a higher speed than blue light.
- 4) Red light has a longer wavelength than blue light.

B Which row in the table correctly describes the movement of galaxies at the present time?

| | Relative to Earth | Relative to each other |
|---|-------------------|------------------------|
| 1 | moving away | moving away |
| 2 | moving away | moving closer |
| 3 | moving closer | moving away |
| 4 | moving closer | moving closer |

C Scientists have used their calculations to deduce the movement of galaxies hundreds of millions of years ago.

Which row in the table correctly describes the movement of galaxies hundreds of millions of years ago?

| | Relative to Earth | Relative to each other |
|---|-------------------|------------------------|
| 1 | moving away | moving away |
| 2 | moving away | moving closer |
| 3 | moving closer | moving away |
| 4 | moving closer | moving closer |

D Red-shift provides direct evidence that the Universe . . .

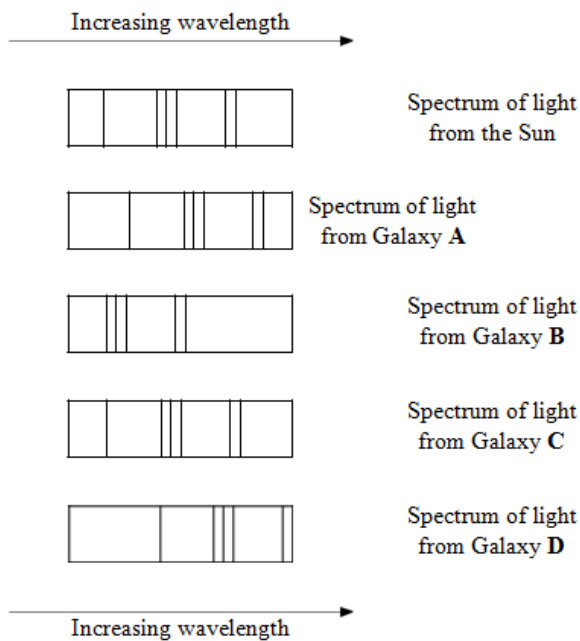
1) is expanding.

2) is expanding and must have started at the 'big bang'.

3) is expanding and must have started from a tiny starting point.

4) is expanding and must have started from a tiny starting point at the 'big bang'.

Q:2 The visible part of the electromagnetic spectrum from galaxies includes dark lines. These lines are at specific wavelengths. The diagram shows the position of the dark lines in the spectrum from the Sun and in the spectra from four distant galaxies A, B, C and D.



A What is the name of the phenomenon shown in the spectrum from Galaxy A?

1) blue shift

2) green shift

3) yellow shift

4) red shift

B Which one of the galaxies is furthest away from Earth?

- 1)Galaxy A
- 2)Galaxy B
- 3)Galaxy C
- 4)Galaxy D

C Which galaxy is moving towards the observer?

- 1)Galaxy A
- 2)Galaxy B
- 3)Galaxy C
- 4)Galaxy D

D Data from similar investigations shows that . . .

- 1)most galaxies are moving towards Earth.
- 2)the further away a galaxy is from Earth, the faster it is moving away from Earth.
- 3)all galaxies move at a constant speed.
- 4)all galaxies were created at the same time.

Q:3 The radiation from stars produces spectra. By studying these spectra, scientists can learn a lot about the behaviour and history of stars.

Sometimes, lines in a spectrum appear to be shifted towards the longer wavelength end of the spectrum.

A What name is given to the shift towards the longer wavelength end of the spectrum?

- 1)blue-shift
- 2)green-shift
- 3)yellow-shift

4)red-shift

B What information can this shift give scientists about the star that is producing it?

- 1)the diameter of the star**
- 2)the distance the star is from Earth**
- 3)the mass of the star**
- 4)the temperature of the star**

C What theory about the universe does observation of this shift support?

- 1)the universe is contracting**
- 2)the universe is expanding**
- 3)the universe is not changing**
- 4)the universe is expanding and contracting**

D A scientist making measurements with a telescope complains that his observations lack precision. What type of instrument would give more precision?

- 1)one that has been better calibrated**
- 2)one that has been less well calibrated**
- 3)one with a larger scale division**
- 4)one with a smaller scale division**

Q:4 For many years, scientists have been investigating the universe and how it continues to change.

A Why is the 'Big Bang' theory currently the most widely accepted theory of the origin of the universe?

- 1) It has been proved correct by using mathematical models.
- 2) It has not been revised or changed by scientists for many years.
- 3) It is based on a combination of scientific and religious facts.
- 4) It is the best explanation of the current scientific data.

B Red-shift of light provides evidence about how the universe is changing.

When red-shift is detected, it means that . . .

- 1) galaxies are moving rapidly away from Earth.
- 2) galaxies furthest away from Earth are expanding.
- 3) some galaxies are approaching the Earth.
- 4) stars in the nearest galaxies are becoming red giants.

C Red-shift involves a change in frequency and wavelength. Which row in the table correctly describes these changes?

| | Frequency | Wavelength |
|----|-----------|------------|
| 1) | decreases | decreases |
| 2) | decreases | increases |
| 3) | increases | decreases |
| 4) | increases | increases |

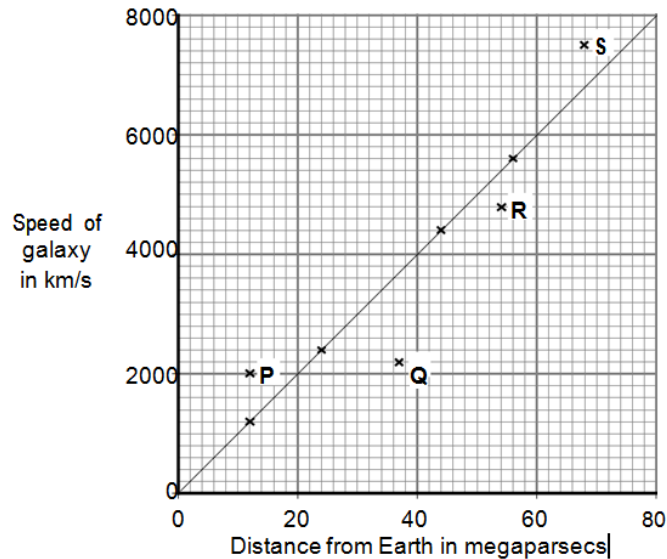
D Which one of the following is a similar effect to red-shift?

- 1) Red light from a lamp being reflected by a mirror.
- 2) As a police car moves away from you, the sound from the siren seems lower in frequency than it really is.
- 3) As a train approaches a station, the sound of the train gets louder.
- 4) Light from the setting Sun becomes increasingly redder.

Q:5 In the early part of the twentieth century, Edwin Hubble made the discovery that distant galaxies are moving away from Earth.

He calculated the speeds at which the galaxies are moving away from Earth and their distances from Earth.

The graph shows Hubble's results.



A megaparsec is a unit of distance

A Which one of the following statements describes what the graph shows?

- 1) All galaxies have different but constant speeds.
- 2) Galaxies will eventually reach a maximum speed.
- 3) Nearer galaxies have the highest speeds.
- 4) The speed of a galaxy is directly proportional to its distance from Earth.

B What is the approximate speed, in km/s, of a galaxy 120 megaparsecs away from Earth?

- 1) 10 000
- 2) 11 000
- 3) 12 000
- 4) 13 000

C The light from four galaxies, P, Q, R and S, is examined for red-shift.

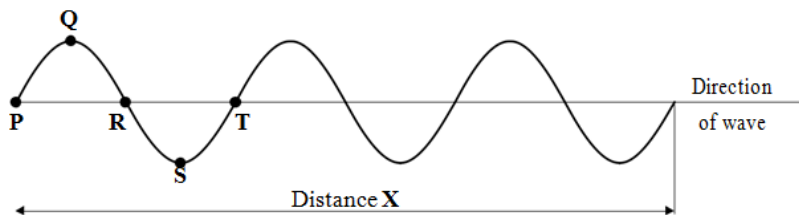
Which one of the following statements about the amount of red-shift is correct?

- 1) P produces the biggest red-shift.
- 2) P, Q, R and S produce the same red-shift.
- 3) Q and R produce the smallest red-shift.
- 4) S produces the biggest red-shift.

D Some galaxies show a blue-shift. These galaxies . . .

- 1) are the most distant galaxies from the Earth.
- 2) are stationary.
- 3) are moving towards the Earth.
- 4) have only just been formed.

Q:6 The diagram shows part of a wave.



A The wavelength of this wave is . . .

- 1) PR
- 2) PT
- 3) RT
- 4) QS

B The wave travels distance X in 1 second. The frequency of the wave is . . .

1)1Hz

2)2Hz

3)3Hz

4)6Hz

C The spectrum of light from a source of white light moving away at high speed shows . . .

1)a 'shift' towards the red end of the spectrum.

2)an increase in the intensity of the ultraviolet radiation.

3)that light travels in straight lines.

4)that red light travels more slowly than blue light in a vacuum.

D Scientists have analysed light from distant galaxies. Their conclusion is that . . .

1)our solar system and distant galaxies are moving apart at high speed.

2)galaxies are moving towards each other at high speed.

3)galaxies are stationary.

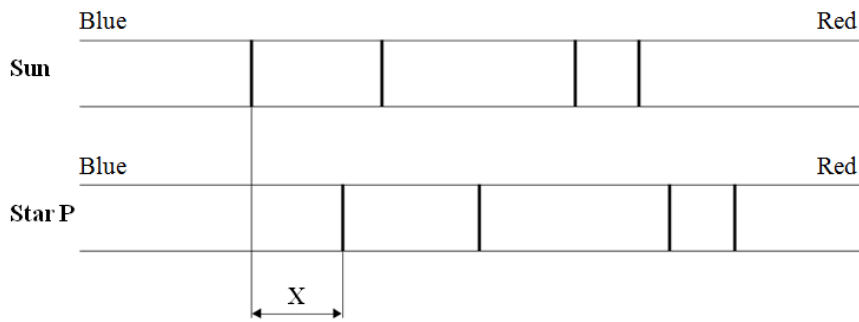
4)the planets in our solar system are moving away from the Sun at high speed.

Q:7 The visible part of the electromagnetic spectrum from a star includes dark lines. These lines are at specific wavelengths.

The diagrams show the positions of the dark lines in the spectrum from the Sun and in the spectrum from a distant star, P.

Star P is moving away from the observer.

The dark lines in P's spectrum are shown to be displaced.



A The displacement marked X in the diagram is called the red-shift.

What change has occurred to the speed and frequency of the light to cause red-shift?

| | Speed | Frequency |
|---|-----------------|-----------------|
| 1 | decreased | stayed the same |
| 2 | increased | stayed the same |
| 3 | stayed the same | decreased |
| 4 | stayed the same | increased |

B Another star, Q, is further away from the observer than star P and is also moving away from the observer.

The displacement X in Q's spectrum, compared with that in P's is . . .

- 1) smaller and in the opposite direction.
- 2) bigger and in the opposite direction.
- 3) smaller and in the same direction.
- 4) bigger and in the same direction.

C Edwin Hubble made measurements on the dark lines in the spectra from distant galaxies.

His observations led to the idea that the universe is expanding.

He observed that . . .

- 1)the further away the galaxy, the smaller the red-shift.
- 2)the further away the galaxy, the bigger the red-shift.
- 3)the most distant galaxies show a blue-shift.
- 4)the red-shift does not change with distance.

D Scientists are interested in how the universe began.

Which one of the following statements is correct?

- 1)We now definitely know that the universe began with a 'big bang'.
- 2)There is no evidence about how the universe began.
- 3)The current evidence suggests that the universe began at a small point.
- 4)We now know that the galaxies will continue to get further apart.

Q:8 Astronomers studying light from distant galaxies notice that the light from them seems to increase in wavelength.

A The increase in wavelength is known as . . .

- 1)blue-shift.
- 2)contraction.
- 3)expansion.
- 4)red-shift.

B The increase in wavelength . . .

- 1)is smaller the further away the galaxy is.
- 2)is larger the further away the galaxy is.
- 3)becomes zero for very distant galaxies.
- 4)is the same whether galaxies are moving towards us or away from us.

C The unit of wavelength is the . . .

- 1) hertz.
- 2) metre.
- 3) metre per second.
- 4) second.

D Most astronomers think that the universe began from a very small initial point.

Since then, the universe has . . .

- 1) been contracting.
- 2) been contracting then expanding.
- 3) been expanding.
- 4) stayed unchanged.

Q:9 Astronomers have observed many distant galaxies and found that the radiation from the galaxies shows a red-shift.

A What happens to the radiation in red-shift?

- 1) The observed wavelength decreases and the frequency increases.
- 2) The observed wavelength increases and the frequency decreases.
- 3) The observed wavelength increases and the frequency increases.
- 4) The observed wavelengths merge together to form red light.

B The astronomers realised that these galaxies are moving away from us.

This led them to produce a theory in which . . .

- 1) the galaxies are contracting towards a small point.
- 2) the galaxies are moving towards each other.
- 3) the universe is contracting towards a small point.
- 4) the universe is expanding from an initial small point.

C The data in the table below shows the red-shift of different galaxies. (They are all for the same spectral line.)

| Name of galaxy | Red shift in nm |
|----------------|-----------------|
| M60 | 18.8 |
| M99 | 32.1 |
| NGC 2366 | 1.3 |
| NGC 2976 | 0.04 |

Which galaxy is furthest from Earth?

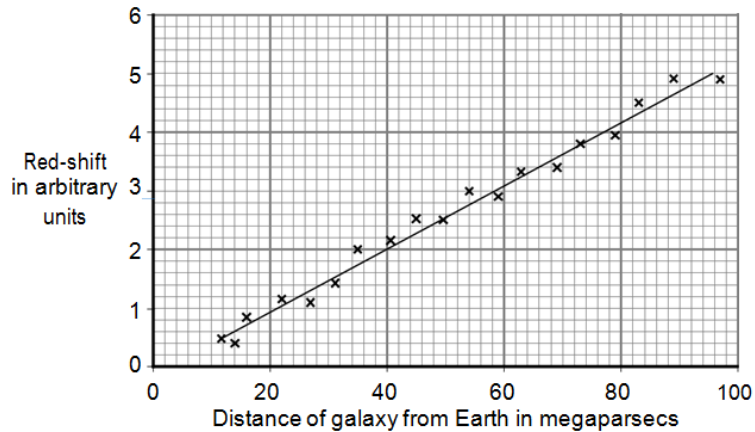
- 1)M60
- 2)M99
- 3)NGC 2366
- 4)NGC 2976

D Astronomers have found that the light from the Sun shows an increase in frequency on one edge and a decrease in frequency on the opposite edge.

What does this suggest is happening to the Sun?

- 1)It is gradually expanding.
- 2)It is moving away from us.
- 3)It is moving towards us.
- 4)It is rotating.

Q:10 The graph shows the red-shift for a number of galaxies.



A megaparsec is a unit of distance used by astronomers.

A The graph shows that . . .

- 1) the further away from Earth a galaxy is, the smaller the red-shift.
- 2) the further away from Earth a galaxy is, the bigger the red-shift.
- 3) the amount of red-shift is the same however far from Earth the galaxy is.
- 4) there is no relationship between red-shift and the distance from Earth.

B A scientist is concerned that not all the points on the graph lie on the straight line. How can the scientist check that the results are reliable?

- 1) ignore the results that do not fit on the line
- 2) use more precise measuring instruments
- 3) make the observations from space telescopes
- 4) compare the data with that obtained by other scientists

C A galaxy produces a red-shift of 2 units. How far from Earth is it?

- 1)20 megaparsecs
- 2)40 megaparsecs
- 3)60 megaparsecs
- 4)80 megaparsecs

D Data is obtained for another distant galaxy that shows red-shift. This data does not fit the pattern of the other galaxies.

Data such as this that does not fit the pattern is called . . .

- 1)accurate.
- 2)anomalous.
- 3)precise.
- 4)sensitive.

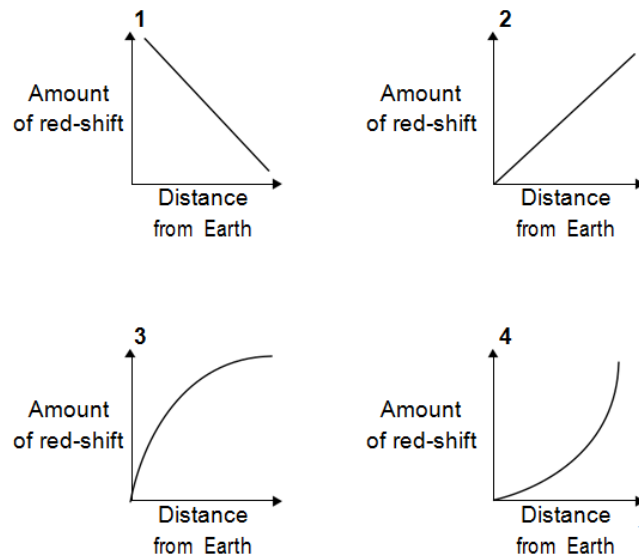
Q:11 The light given out by distant galaxies has the same features as light from a very hot gas in a laboratory. However, the light from distant galaxies is shifted to longer wavelengths. This is called red-shift.

A Red-shift occurs because . . .

- 1)the frequency of light increases as it travels through space.
- 2)the speed of light from galaxies decreases as it travels through space.
- 3)distant galaxies have a relative movement away from the Earth.
- 4)distant galaxies have a relative movement towards the Earth.

B Distant galaxies show an amount of red-shift which is directly proportional to their distance from the Earth.

Which graph shows this relationship?



C The amount of red-shift can be used to estimate the speed of a galaxy relative to Earth.

This led to the discovery that distant galaxies are . . .

- 1) moving faster than nearer galaxies and the universe is contracting.
- 2) moving faster than nearer galaxies and the universe is expanding.
- 3) moving slower than nearer galaxies and the universe is contracting.
- 4) moving slower than nearer galaxies and the universe is expanding.

D There are some galaxies close to the Earth that are moving towards the Earth.

Light from these galaxies has . . .

- 1) an observable decrease in its frequency.
- 2) an observable decrease in its wavelength.

3) smaller red-shifts than distant galaxies.

4) no change in its wavelength.

Q:12 Scientists have observed that light from distant galaxies seems to have increased in wavelength.

A What is this apparent increase in wavelength called?

1) black hole formation

2) blue-shift

3) red-shift

4) the Hubble effect

B What does the apparent increase in wavelength suggest about the universe?

1) The universe is expanding.

2) The universe is contracting.

3) The universe was expanding but is now contracting.

4) The universe was contracting but is now expanding.

C What does the apparent increase in wavelength suggest about the origin of the universe?

1) The universe started from one small point.

2) The universe was formed by gravity pulling material together.

3) The universe was formed by two galaxies colliding.

4) The universe had no starting point; it has always existed.

D What name is given to the theory about the origin of the universe that has been developed from these observations?

1) big bang theory

2) steady state theory

3) relativity theory

4) gravitational theory

TOTAL MARKS=48