37. A man watches a train pass by him.

If the train is travelling at 10 m/s and takes 5 s to pass by, what is the length of the train?

A 0.5 m

B 2 m

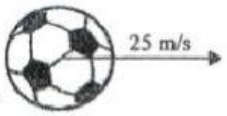
C 50 m

D 500 m

38. Marcus cycles at a steady speed of 6 m/s for 2 minutes.
What is the average distance covered by Marcus?

A. 12 m
B. 20 m
C. 360 m
D. 720 m

39. A soccer ball moving with a velocity of 25.0 m/s has a momentum of 12.5 kg m/s.



What is the mass of the ball?

A. 0.5 kg
B. 12.5 kg
C. 37.5 kg
D. 312.5 kg

40. The half-life of radioactive thorium-234 is 24 days. A sample contains 8g of thorium-234.

After how many days will it contain only 2g of thorium-234?

A. 24 days
B. 48 days
C. 72 days
D. 96 days

41. How many neutrons are in the nucleus of an $^{238}_{92}U$ atom?

A. 238
B. 146
C. 119
D. 92

42. Which of the following lists the types of radiation in the order of increasing ionising ability?

A. alpha, gamma, beta
B. beta, alpha, gamma
C. alpha, beta, gamma
D. gamma, beta, alpha

43. Mo-99 decays into Tc-99 as shown in the equation.

$$^{99}_{42}Mo \rightarrow ^{99}_{43}Tc + ^{0}_{-1}X$$

What is X?

A. a neutron
B. an alpha particle
C. a beta particle
D. a gamma ray

44. Which type of radiation can be stopped by a sheet of paper?

A. α-particles
B. β-particles
C. γ-rays
D. X-rays

45. Animal contains some carbon-14 atoms. Carbon-14 is radioactive. The remains of an animal are tested for radioactive emissions and the count rate is measured as 2 counts per minute. When the animal died the count rate was 16 counts per minute. The half-life of carbon-14 is 6 000 years.

How old are the animal's remains?

A. 2 000 years
B. 3 000 years
C. 6 000 years
D. 18 000 years

46. He-4 and He-2 are both atoms of helium. They can be represented as

$$^{4}_{2}He \text{ and } ^{3}_{2}He$$

Which statement is true?

A. an atom of $^{4}_{2}He$ has the same mass number as an atom of $^{3}_{2}He$
B. an atom of $^{4}_{2}He$ has the same number of neutrons as an atom of $^{3}_{2}He$
C. an atom of $^{4}_{2}He$ has one more electron than an atom of $^{3}_{2}He$
D. an atom of $^{4}_{2}He$ has the same number of protons as an atom of $^{3}_{2}He$

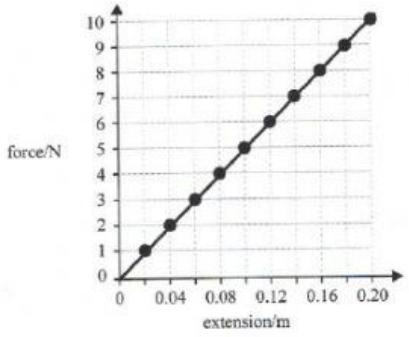
47. A radioactive decay can be represented as shown.

$$^{226}_{88}Ra \rightarrow ^{226}_{86}Rn + X$$

What does X represent in this decay?

A. a neutron
B. a proton
C. an α-particle
D. a β-particle

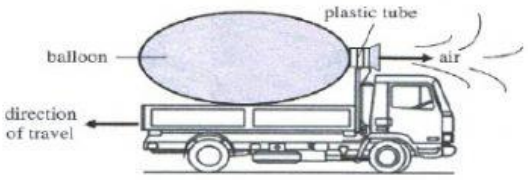
48. A student applies various weights to a spring and records its extension for each weight. The results are plotted on the graph shown.



Which weight will cause a spring to stretch from 0.14 m to 0.20 m?

A. 3 N
B. 7 N
C. 10 N
D. 17 N

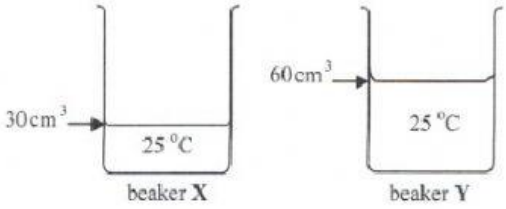
49. An inflated balloon is attached to a toy truck as shown. The mouth of the balloon is opened so that the air is released. The toy truck starts to move in the opposite direction.



Which law of physics is illustrated by the moving toy truck?

A. Hooke's Law
B. Ohm's Law
C. Boyle's Law
D. Newton's Third Law

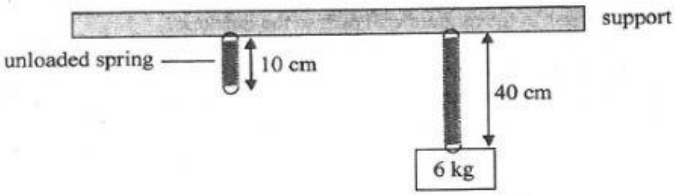
50. The diagram shows two similar beakers, **X** and **Y** containing different volumes of water at the same temperature as shown. The temperature and volume of water in each beaker is labelled on the diagram.



Which row describes the average kinetic energy of the water molecules and a comparison of the thermal energy in each beakers?

	average kinetic energy	**thermal energy**
A.	same for both	greater in beaker **X**
B.	same for both	greater in beaker **Y**
C.	greater in beaker **X**	same for both
D.	greater in beaker **Y**	same for both

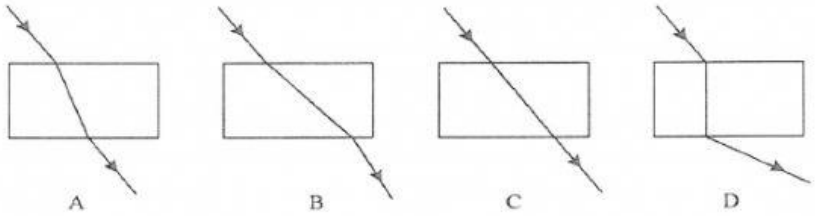
51. The diagram shows an unloaded spring hanging from a support and the same spring loaded with a 6 kg mass.



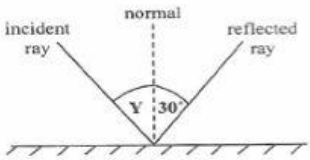
What will be the length of the spring when it is loaded with a 2 kg mass?

A. 20 cm
B. 30 cm
C. 40 cm
D. 60 cm

52. Which of the following diagrams correctly shows the path of a ray of light as it passes through a glass block?



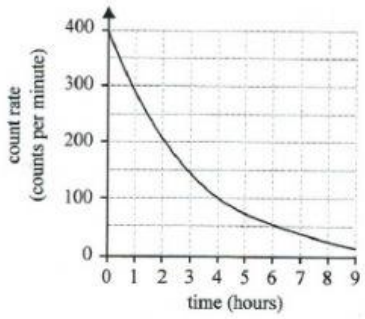
53. The diagram illustrates the reflection of light from a plane mirror.



What is angle Y?

A 20°
B 30°
C 60°
D 90°

54. The graph below shows how the count rate of a certain radioactive isotope changes with time, as it decays.



What is the half-life of this radioactive isotope?

A. 1 hour
B. 2 hours
C. 4 hours
D. 6 hours