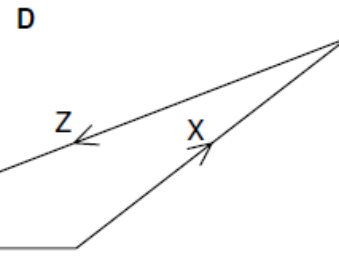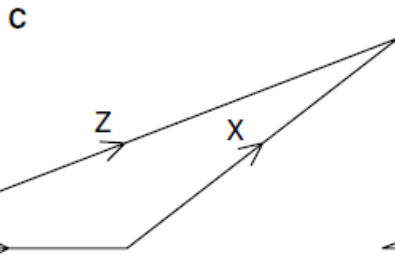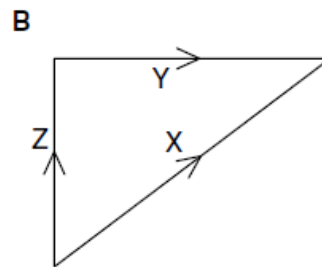Mcq all combined from 2002

2 The diagram shows two vectors X and Y.
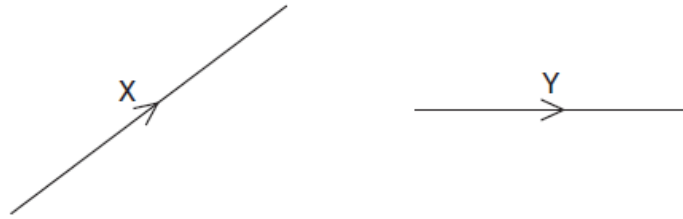
In which vector triangle does the vector Z show the magnitude and direction of vector X – Y?
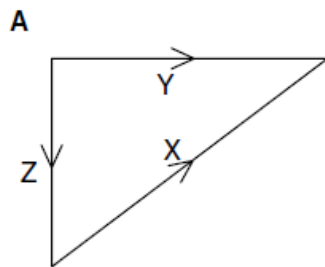
D

11 A body, initially at rest, explodes into two masses M_1 and M_2 that move apart with speeds v_1 and v_2 respectively.

What is the ratio $\dfrac{v_1}{v_2}$?

A $\dfrac{M_1}{M_2}$ B $\dfrac{M_2}{M_1}$ C $\left(\dfrac{M_1}{M_2}\right)^{\frac{1}{2}}$ D $\left(\dfrac{M_2}{M_1}\right)^{\frac{1}{2}}$

B

**14** A cylindrical block of wood has a cross-sectional area A and weight W. It is totally immersed in water with its axis vertical. The block experiences pressures p_t and p_b at its top and bottom surfaces respectively.

Which of the following expressions is equal to the upthrust on the block?

A $(p_b - p_t)A + W$

B $(p_b - p_t)$

C $(p_b - p_t)A$

D $(p_b - p_t)A - W$

C

28 The diagram shows an experiment which has been set up to demonstrate two-source interference, using microwaves of wavelength λ.
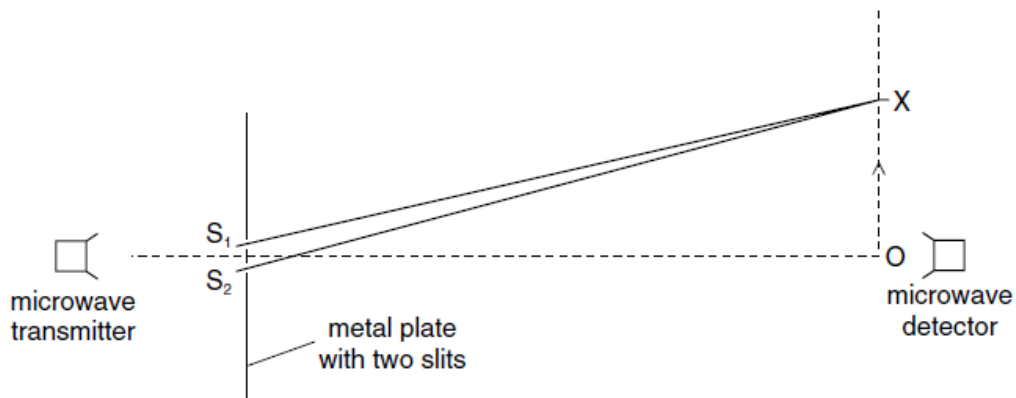

The detector is moved from O in the direction of the arrow. The signal detected decreases until the detector reaches the point X, and then starts to increase again as the detector moves beyond X.

Which equation correctly determines the position of X?

A $OX = \lambda/2$ B $OX = \lambda$ C $S_2X - S_1X = \lambda/2$ D $S_2X - S_1X = \lambda$

C

35 A potential divider is used to give outputs of 2 V and 3 V from a 5 V source, as shown.

+5V •

R_1

• +3V

R_2

• +2V

R_3

0V •
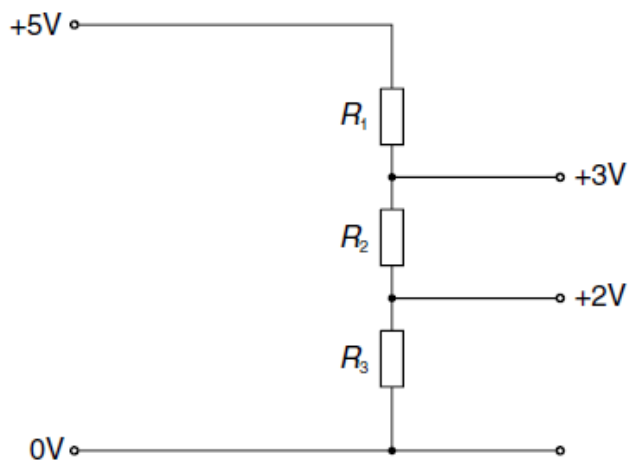
What are possible values for the resistances R_1, R_2 and R_3?

	$R_1/k\Omega$	$R_2/k\Omega$	$R_3/k\Omega$
A	2	1	5
B	3	2	2
C	4	2	4
D	4	6	10

C

20 A child drinks a liquid of density ρ through a vertical straw.

Atmospheric pressure is p_0 and the child is capable of lowering the pressure at the top of the straw by 10%. The acceleration of free fall is g.

What is the maximum length of straw that would enable the child to drink the liquid?

A $\dfrac{p_0}{10\rho g}$ B $\dfrac{9p_0}{10\rho g}$ C $\dfrac{p_0}{\rho g}$ D $\dfrac{10p_0}{\rho g}$

A

40 Protons and neutrons are thought to consist of smaller particles called quarks.

The 'up' quark has a charge of $\frac{2}{3}e$: a 'down' quark has a charge of $-\frac{1}{3}e$, where e is the elementary charge (+1.6 x 10^{-19}C).
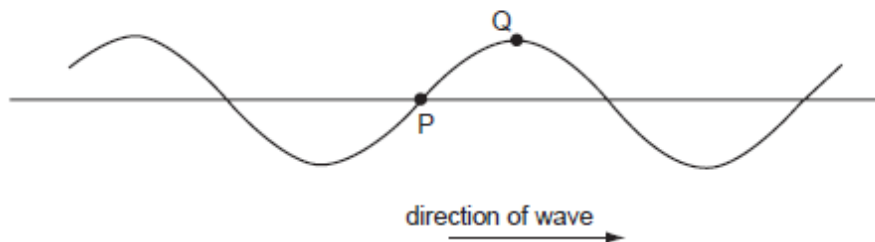
How many up quarks and down quarks must a proton contain?

	up quarks	down quarks
A	0	3
B	1	1
C	1	2
D	2	1

D

25 The diagram shows a transverse wave on a rope. The wave is travelling from left to right.

At the instant shown, the points P and Q on the rope have zero displacement and maximum displacement respectively.

direction of wave

Which of the following describes the direction of motion, if any, of the points P and Q at this instant?

	point P	point Q
A	downwards	stationary
B	stationary	downwards
C	stationary	upwards
D	upwards	stationary

A

3   An Olympic athlete of mass 80 kg competes in a 100 m race.

What is the best estimate of his mean kinetic energy during the race?

A 4×10^2 J   B 4×10^3 J   C 4×10^4 J   D 4×10^5 J

B

7   A boy throws a ball vertically upwards. It rises to a maximum height, where it is momentarily at rest, and falls back to his hands.

Which of the following gives the acceleration of the ball at various stages in its motion? Take vertically upwards as positive. Neglect air resistance.

	rising	at maximum height	falling
A	$-9.81\,\mathrm{m\,s^{-2}}$	0	$+9.81\,\mathrm{m\,s^{-2}}$
B	$-9.81\,\mathrm{m\,s^{-2}}$	$-9.81\,\mathrm{m\,s^{-2}}$	$-9.81\,\mathrm{m\,s^{-2}}$
C	$+9.81\,\mathrm{m\,s^{-2}}$	$+9.81\,\mathrm{m\,s^{-2}}$	$+9.81\,\mathrm{m\,s^{-2}}$
D	$+9.81\,\mathrm{m\,s^{-2}}$	0	$-9.81\,\mathrm{m\,s^{-2}}$

B

34 The *I-V* characteristics of two electrical components P and Q are shown below.
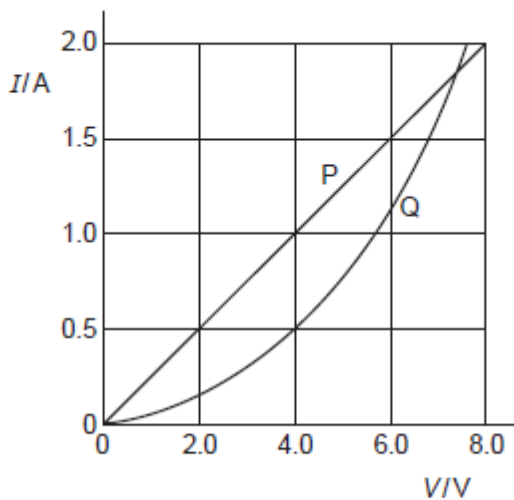
Which statement is correct?

A P is a resistor and Q is a filament lamp.

B The resistance of Q increases as the current in it increases.

C At 1.9 A the resistance of Q is approximately half that of P.

D At 0.5 A the power dissipated in Q is double that in P.

D