Name of the Student:_____
Max. Marks : 16 Marks **Time : 16 Minutes**

Mark Schemes

Q1.

(a) h = 1.75 (m)

1

$E_p = 60 \times 9.8 \times 1.75$

allow a correct substitution using an incorrectly / not converted value of h

1

E_p = 1029 (J)

allow a correct calculation using an incorrectly / not converted value of h

1

$$P = \frac{1029}{1.40}$$

allow a correct substitution using their calculated value of E_p

1

P = 735 (W)

allow an answer consistent with their value for E_p

1

(b) girl increases her kinetic energy (as well as increasing her gravitational potential energy)

1

some energy is wasted in her muscles
or
some energy transferred as thermal energy (to surroundings)

allow some energy transferred due to air resistance
ignore unqualified references to friction
ignore references to sound

1

(c) the boy's mass was greater than the girl's mass

1

[8]

Q2.

(a) $E_e = 0.5 \times 50 \times 0.12^2$

1

$E_e = 0.36$ (J)

1

$0.36 = 0.5 \times 0.020 \times v^2$

allow a correct substitution of their calculated value of E_e

1

$$v^2 = \frac{0.36}{0.5 \times 0.020}$$

allow a correct rearrangement of their calculated value of E_e

or

$v^2 = 36$

1

speed = 6.0

allow an answer consistent with their calculated value of E_e

1

m/s

or

metres/second

1

Alternative approach:
(F = ke)
(F = 50 × 0.12)
(maximum) F = 6.0 (N) (1)

(F = ma)
(6.0 = 0.020 × a)
(maximum) a = 300 (m/s^2) (1)
mean a = 150 (m/s^2) (1)
($v^2 - u^2 = 2as$)
$v^2 = 2 \times 150 \times 0.12$ (1)
or
$v^2 = 36$
v = 6.0 (1)
m/s (1)
or
metres/second

(b) kinetic

1

(c) increasing the extension of the spring
or
more elastic potential energy
or
increase the angle of release (to the horizontal by a small amount)

allow other factors that would increase the horizontal distance travelled eg a tail-wind

ignore factors without a change specified e.g. extension unqualified would not score

ignore changing the spring or changes to the toy aeroplane

1

[8]