Jawapan

Bab 1

BAB 1

Daya dan Gerakan II
Force and Motion II

1.1 Daya Paduan
Resultant force

1. jumlah semua daya, daya tunggal
sum of all forces, single force

2. (a) keadaan rehat, halaju malar
stationary, constant velocity
(i) pegun
stationary
(ii) halaju seragam
constant velocity

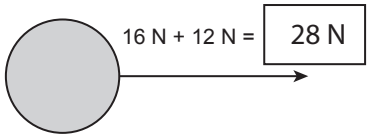
(b) 25 N – 15 N = 10 N

besar, 10 N / *greater, 10 N*

(c) 15 N – 5 N = 10 N

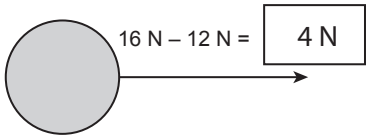
(i) kecil, 10 N
smaller, 10 N

3. (a) 16 N + 12 N = 28 N

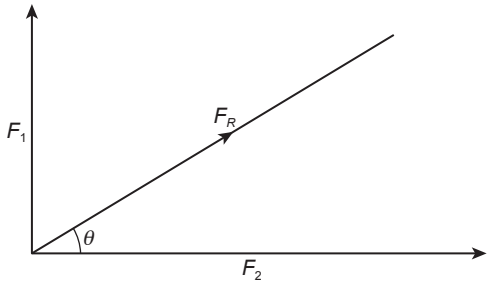


(b) sama / *same*

16 N – 12 N = 4 N

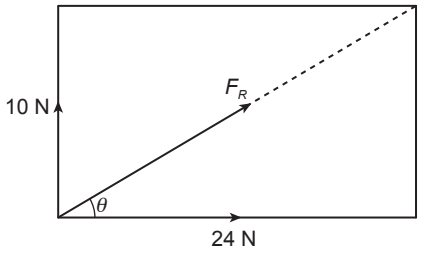


4.



Teorem Pythagoras
Pythagoras' Theorem

5. (a)

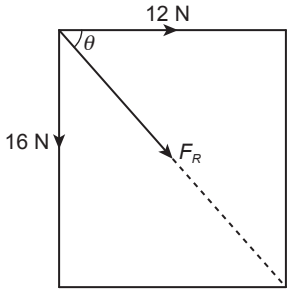


Daya paduan, $F_R = \sqrt{10^2 + 24^2} = 26$ N

$\tan \theta = \frac{F_1}{F_2} = \frac{10}{24} = 0.4167$

$\theta = \tan^{-1} 0.4167 = 22.62°$

(b)



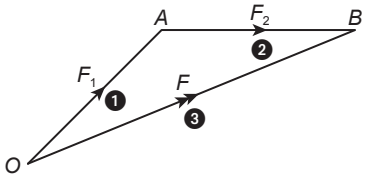
Daya paduan, $F_R = \sqrt{16^2 + 12^2} = 20$ N

$\tan \theta = \frac{F_1}{F_2} = \frac{16}{12} = 1.333$

$\theta = \tan^{-1} 1.333 = 53.13°$

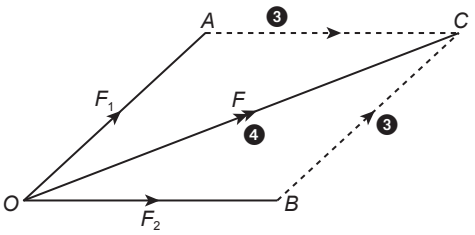
6. kaedah segi empat selari daya, kaedah segi tiga daya
the parallelogram of forces method, triangle of forces method

7. (a)



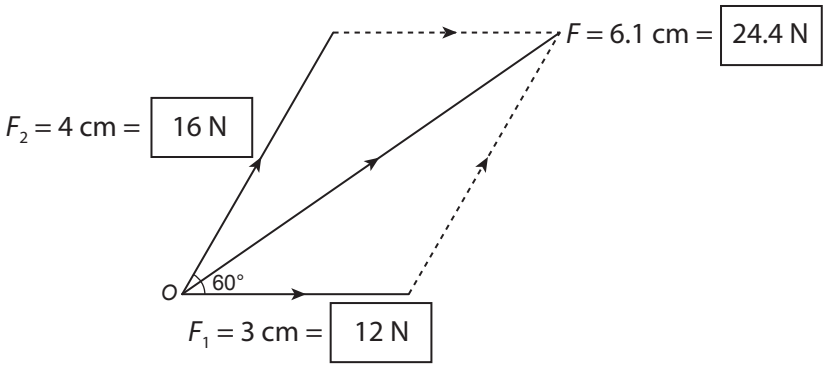
Daya paduan, $F = F_1 + F_2$
Resultant force

(b)

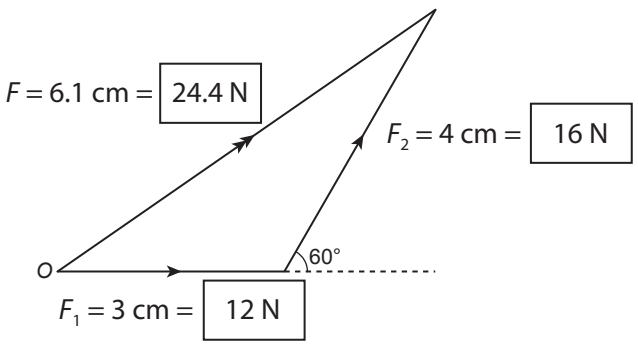


Daya paduan, $F = F_1 + F_2$
Resultant force

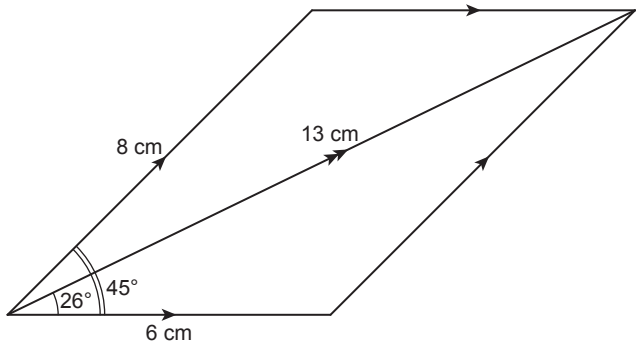
8. (a)



(b)

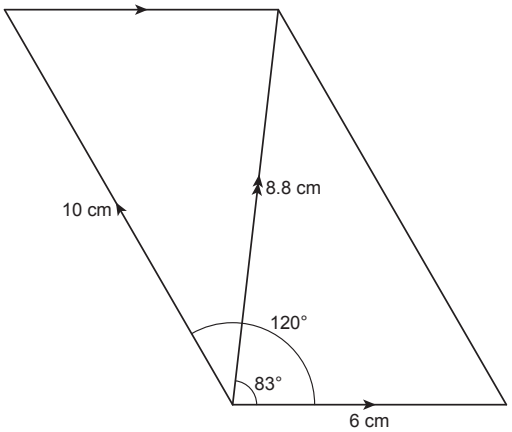


9. (a) Skala 1 cm : 1 N
Scale 1 cm = 1 N



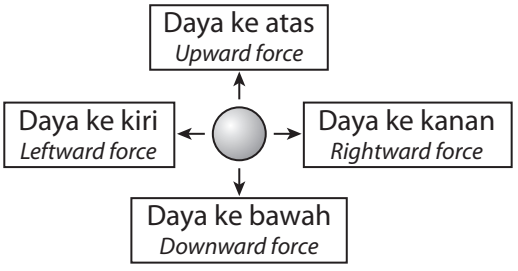
Magnitud daya paduan
Magnitude of resultant force
$= 13 \times 1 = 13$ N
Arah daya paduan ialah 26° dengan arah daya mengufuk.
The direction of the resultant force is 26° with the direction of the horizontal force.

(b) Skala 1 cm : 1 N / *Scale 1 cm = 1 N*

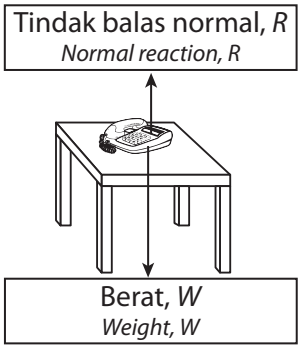


Magnitud daya paduan
Magnitude of resultant force
$= 8.8 \times 1 = 8.8$ N
Arah daya paduan ialah 83° dengan arah daya mengufuk.
The direction of the resultant force is 83° with the direction of the horizontal force.

10. (a)



(b)



11. (a) ✓ (b) ✓

12. (a) Daya paduan, $F = 0$ N
Resultant force, F = 0 N
Berat = Tindak balas normal
Weight = Normal reaction
Pecutan, $a = 0$ m s^{-2}
Acceleration, a = 0 m s^{-2}

(b) Daya paduan, $F = 0$ N
Resultant force, F = 0 N
Berat = Tindak balas normal
Weight = Normal reaction
Tujahan Enjin = Daya geseran
Engine thrust = Frictional force
Pecutan, $a = 0$ m s^{-2}
Acceleration, a = 0 m s^{-2}

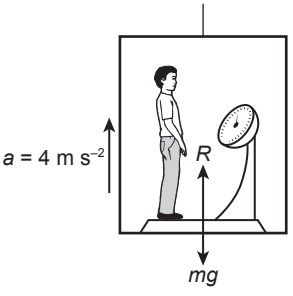
(c) Daya paduan $F \neq 0$ N
Resultant force, F ≠ 0 N
Objek dalam pecutan
Oject in acceleration
Berat = Tindak balas normal
Weight = Normal reaction
Tujahan Enjin > Daya geseran
Engine thrust > Frictional force
Pecutan, $a \neq 0$ m s^{-2}
Acceleration, a ≠ 0 m s^{-2}

13. (a) $F = ma$
$12 = 3a$
$a = 4$ m s^{-2}

(b) $F = ma$
$37 - 12 = 5a$
$a = 5$ m s^{-2}

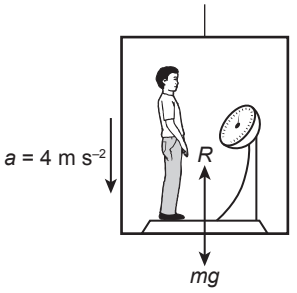
(c) $F - F_R = ma$
$F - 6 = 4 \times 2$
$F = 14$ N

(d) (i) Lif itu bergerak ke atas
The lift moves upwards



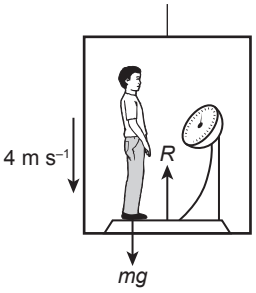
$F = ma$
$R - mg = ma$
$R = ma + mg$
$= 50 \times 4 + 50 \times 10$
$= 700$ N
Bacaan penimbang
Reading of the weighing machine
$= 700$ N

(ii) Lif itu turun ke bawah
The lift goes down



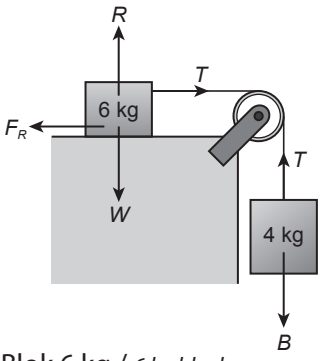
$F = ma$
$mg - R = ma$
$R = mg - ma$
$= 50 \times 10 - 50 \times 4$
$= 300$ N
Bacaan penimbang
Reading of the weighing machine
$= 300$ N

(iii)



$F = ma$
$R - mg = m \times 0$
(halaju seragam, pecutan sifar)
(constant velocity, zero acceleration)
$R = mg$
$= 50 \times 10$
$= 500$ N
Bacaan penimbang
Reading of the weighing machine
$= 500$ N

(e) (i)

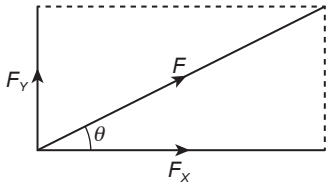


(ii) Blok 6 kg / *6 kg block*
$T - F_R = 6a$
$T - 10 = 6a$
$T = 6a + 10$ ..... (1)
Beban 4 kg / *4 kg load*
$B - T = 4a$
$40 - T = 4a$
$T = 40 - 4a$ ..... (2)
Menggantikan (1) ke dalam (2)
Replace (1) into (2)
$6a + 10 = 40 - 4a$
$10a = 30$
$a = 3.0$ m s^{-2}
Maka, / *Hence,*
Tegangan tali / *Tension of string*
$T = 6a + 10$, $T = 6(3) + 10 = 28$ N

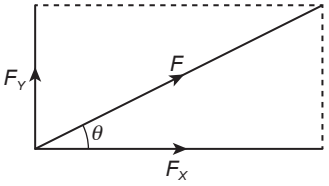
1.2 Leraian Daya
Resolution of Forces

1. (a) memecahkan suatu daya
breaking up a force

(b)



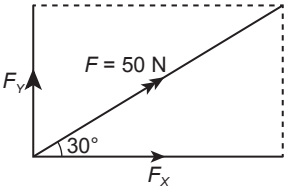
2. (a)



(b) $\kos \theta = \dfrac{F_X}{F}$
$F_X = F \kos \theta$

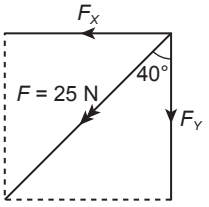
(c) $\sin \theta = \dfrac{F_Y}{F}$
$F_Y = F \sin \theta$

3. (a) Komponen mengufuk:
Horizontal component
$F_X = F \kos 30°$
$= 50(0.866)$
$= 43.3$ N ke kanan / *to the right*
Komponen menegak:
Vertical component
$F_Y = F \sin 30°$
$= 50(0.5)$
$= 25$ N ke atas / *upward*

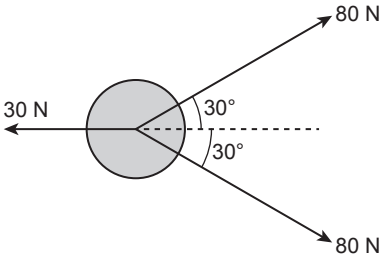


(b) Komponen mengufuk:
Horizontal component
$F_X = F \sin 40°$
$= 25(0.6428)$
$= 16.07$ N ke kiri / *to the left*
Komponen menegak:
Vertical component

$F_Y = F$ kos 40°
= 25(0.766)
= 19.15 N ke bawah / *downward*



4. (a)



(i) Jumlah daya ke kanan
Total force to the right
= jumlah komponen mengufuk
Sum of horizontal component
= 80 kos 30° + 80 kos 30° – 30
= 80(0.866) + 80(0.866) – 30
= 69.28 + 69.28 – 30
= 108.56 N

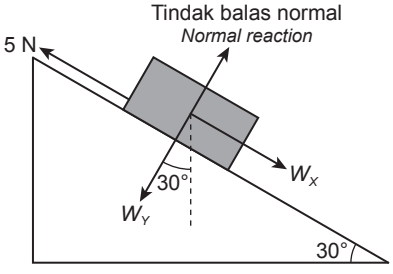
(ii) $F = ma$

$a = \frac{108.56}{15} = 7.24 \text{ m s}^{-2}$

(b) Daya ke kanan / *Force to the right*
= 20 kos 60°
= 20(0.5) = 10 N
Daya bersih / *Nett force* = 10 – 8 = 2 N
$F = ma$

$a = \frac{F}{m} = \frac{2}{50} = 0.04 \text{ m s}^{-2}$

(c) (i)



(ii) $W_x = 50 \sin 30°$
$= 25$ N

$W_Y = 50$ kos 30°
$= 43.3$ N
Daya-daya paduan yang serenjang dengan satah condong = 43.3 + (–43.3) = 0 N
Resultant of the forces perpendicular to the inclined plane = 43.3 + (–43.3) = 0 N
Daya-daya paduan yang selari dengan satah condong = 25 + (–5) = 20 N
Resultant of the forces parallel to the inclined plane = 25 + (–5) = 20 N

(iii) Daya paduan, / *Resultant force*, $F = 20$ N
Jisim bongkah / *Mass of block*, m = 5 kg
$F = ma$
Pecutan bongkah / *Acceleration of block*

$a = \frac{F}{m} = \frac{20}{5} = 4 \text{ m s}^{-2}$

1.3 Keseimbangan Daya
Equilibrium of Forces

1. daya paduan sifar
zero resultant force

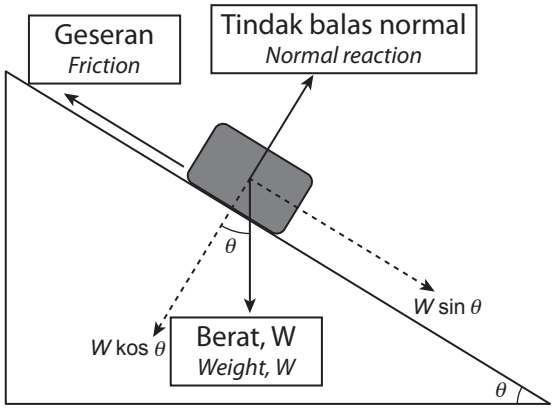
2.

Apabila keseimbangan daya berlaku, jumlah semua komponen-komponen daya mengufuk dan menegak ialah
When all the forces are in equilibrium, then the sum of all horizontal and vertical components of the forces are

- tidak sifar *not zero*
- sifar *zero*

3. (a) berat / *weight*
(b) bertentangan / *opposite directions*
(c) sifar, keseimbangan / *zero, equilibrium*

4. sifar / *zero*

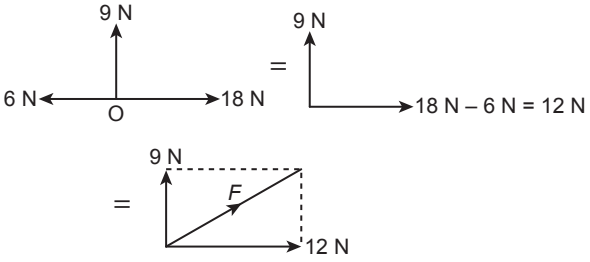


Pada keseimbangan :
At equilibrium :

(a) Tindak balas normal = W kos θ
Normal Reaction = W cos θ

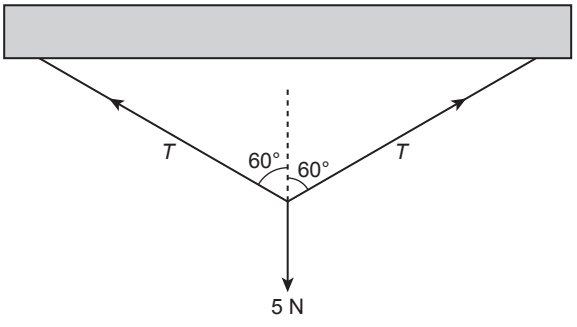
(b) Geseran = W sin θ
Friction = W sin θ

5. (a)



Magnitud daya paduan
Resultant force magnitude
$= F = \sqrt{9^2 + 12^2} = 15$ N

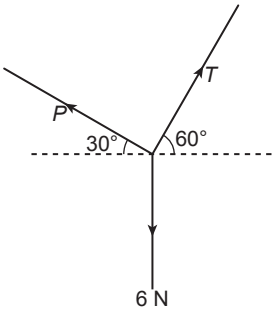
(b)



Jumlah komponen menegak = 0,
Sum of vertical component = 0,
T kos 60° + T kos 60° = 5 N
$T(0.5) + T(0.5) = 5$ N
$T = 5$ N

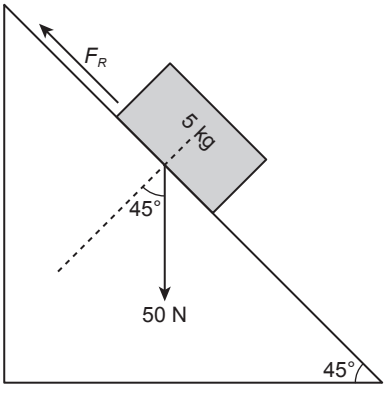
(c) (i) Berat objek = 6 × 10 = 60 N
Weight of object

(ii)



Jumlah komponen mengufuk = 0,
Sum of horizontal component = 0,
T kos 60° = P kos 30°
$T(0.5) = P(0.866)$
$T = 1.732P$ 1
Jumlah komponen menegak = 0,
Sum of vertical component = 0,
$60 = P \sin 30 + T \sin 60°$
$60 = 0.5P + 0.866T$ 2
Persamaan 1 dalam 2
Equation 1 in 2
$60 = 0.5P + 0.866(1.732P)$
$60 = 0.5P + 1.5P$
$2P = 60$
$P = 30$ N
Maka $T = 1.732P = 1.732(30) = 51.96$ N

(d)



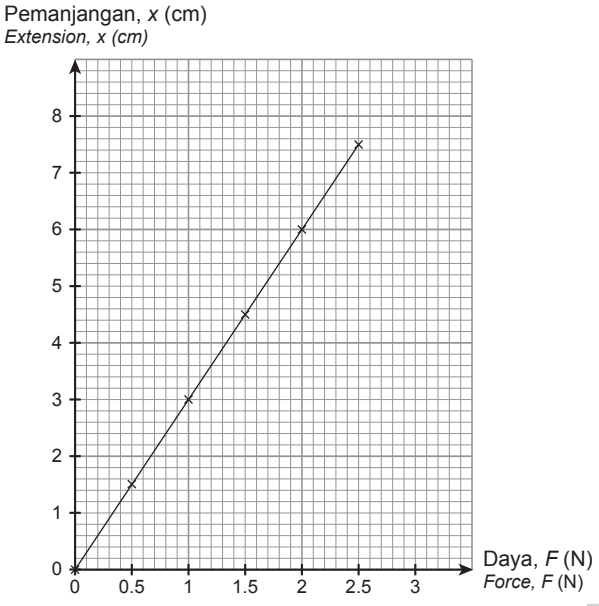
Jumlah komponen mengufuk untuk landasan condong = 0,
Sum of horizontal component for inclined plane = 0
$F_R = 50 \sin 45$
$F_R = 50(0.7071)$
$= 35.36$ N

1.4 Kekenyalan
Elasticity

1. (a) asalnya, dialihkan
original, removed.
(b) (i) dialihkan / *removed*
(ii) dialihkan / *removed*
(iii) regangan / *Stretching*
(iv) mampatan / *Compression*

2. **Inferens / *Inference*:**
Pemanjangan / *extension*
Hipotesis / *Hypothesis*:
besar, besar / *greater, longer*
Tujuan / *Aim*:
pemanjangan / *extension*
Pemboleh ubah / *Variables*:
(a) Daya / Berat beban, *F*
Force / Weight of load, F
(b) Pemanjangan spring / *Extension of spring*
(c) Jenis spring / *Type of spring*
Keputusan / *Results*:

Jisim, *m* (g) *Mass, m (g)*	0	50	100	150	200	250
Daya, *F* (N) *Force, F (N)*	0	0.5	1.0	1.5	2.0	2.5
Panjang, *L* (cm) *Length, l (cm)*	6.0	7.5	9.20	10.5	12.0	13.5
Pemanjangan, *x* (cm) *Extension, x (cm)*	0.0	1.5	3.0	4.5	6.0	7.5

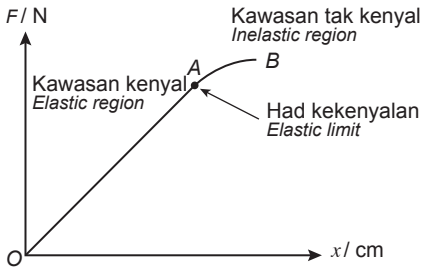


Perbincangan / *Discussion*:
berkadar terus, $x \propto F$ / *directly proportional, $x \propto F$*
Kesimpulan / *Conclusion*:
berkadar terus / *directly proportional*

3. berkadar terus, had kekenyalan
directly proportional, limit of elasticity

4. x = Pemanjangan spring
Extension of the spring
k = Pemalar spring / *Spring constant*

5. daya maksimum / *maximum force*

6.


7. Pemalar spring, $k = \frac{F}{x}$ mempunyai unit N m^{-1} atau N cm^{-1}.
Spring constant, $k = \frac{F}{x}$ with units N m^{-1} or N cm^{-1}.

8. (a) Pemalar spring = kecerunan graf = $\frac{20\text{ N}}{8\text{ cm}} = 2.5\text{ N cm}^{-1}$
The spring constant = gradient of the graph = $\frac{20\text{ N}}{8\text{ cm}} = 2.5\text{ N cm}^{-1}$
(b) 2.5 N, 1 cm / *2.5 N, 1 cm*

9. (a) Pemanjangan / *Extension*,
$x = 12\text{ cm} - 10\text{ cm} = 2\text{ cm} = 0.02\text{ m}$
Pemalar spring / *Spring constant*,
$k = \frac{F}{x} = \frac{0.4 \times 10\text{ N}}{0.02\text{ m}} = 200\text{ N m}^{-1}$
(b) Pemanjangan / *Extension*
$x = \frac{F}{k} = \frac{0.6 \times 10}{200} = 0.03\text{ m} = 3\text{ cm}$
Panjang spring / *Length of the spring* = 13 cm

10. Dengan membandingkan Rajah (b) dan Rajah (c), / Comparing Diagram (b) and Diagram (c)
Beban sebanyak 20 g (30 g – 10 g) memanjangkan spring sebanya 4 cm (16 cm – 12 cm)

Load of 20 g (30 g – 10 g) extends the spring by 4 cm (16 cm – 12 cm)

Pemalar spring, $k = \frac{F}{x} = \frac{0.02 \times 10\ \text{N}}{0.04\ \text{m}}$
Spring constant
$= 5\ \text{N m}^{-1}$

Pemanjangan untuk Rajah (a), $x = \frac{F}{k} = \frac{0.01 \times 10}{5} = 0.02\ \text{m} = 2\ \text{cm}$

Extension in Diagram (a)

Panjang asal = l = (12 – 2) cm = 10 cm
Initial length

11. dipanjangkan, dimampatkan
lengthened, compressed

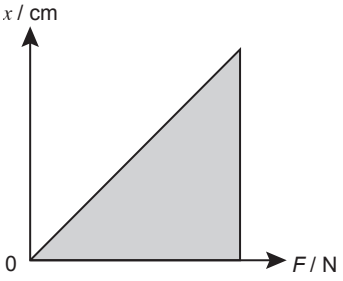
12. Tenaga keupayaan kenyal
Elastic potential energy:

$E_P = \frac{1}{2} Fx$

Jika / *If* $F = kx$

$E_P = \frac{1}{2}(kx)x$

$E_P = \frac{1}{2} kx^2$



13. Pemampatan spring / *Spring compression*, x = 15 cm – 12 cm = 3 cm = 0.03 m
Pemalar spring / *Spring constant*,

$k = \frac{F}{x} = \frac{0.5 \times 10\ \text{N}}{0.03\ \text{m}} = 166.67\ \text{N m}^{-1}$

Tenaga keupayaan kenyal,
Elastic potential energy

$E_P = \frac{1}{2} kx^2$

$E_P = \frac{1}{2}(166.67)0.03^2$

$E_P = 0.075\ \text{J}$

14. Tenaga keupayaan kenyal, E_P
Elastic potential energy

$= \frac{1}{2} Fx = \frac{1}{2}(20)(0.08) = 0.8\ \text{J}$

15. (a) $E_P = \frac{1}{2} Fx$

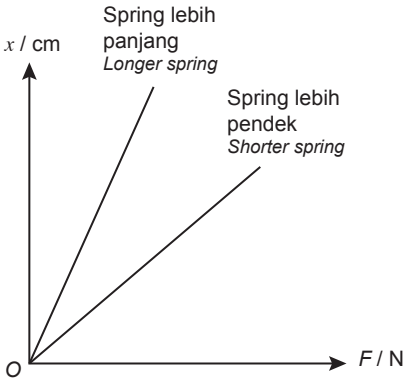
$4.0 = \frac{1}{2}(100)\, x$

$x = 0.04\ \text{m} = 4\ \text{cm}$

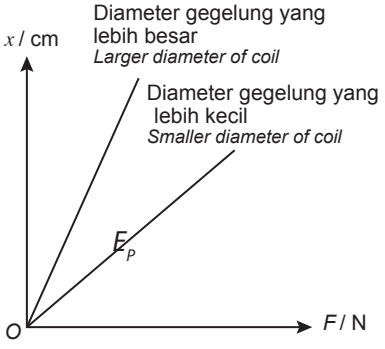
(b) $F = kx$

$k = \frac{F}{x} = \frac{100}{0.04} = 2500\ \text{N m}^{-1}$

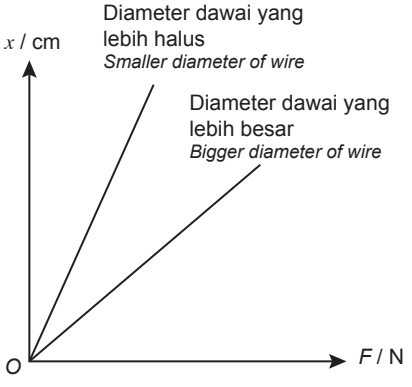
16. (a)



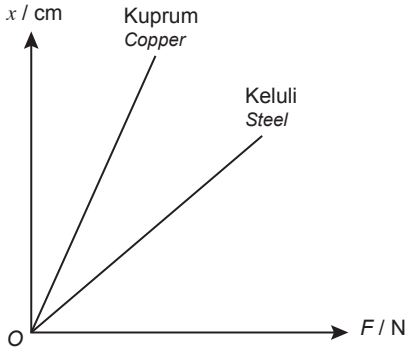
(b)



(c)



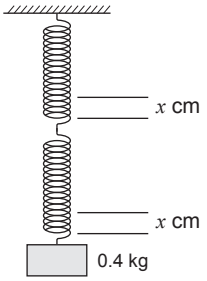
(d)



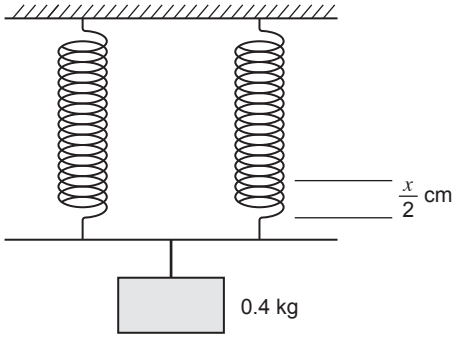
17. Bersiri / *Series*, nx

Selari / *Parallel*, $\frac{x}{n}$

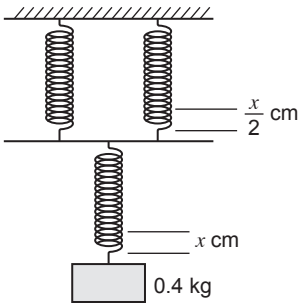
18. (a) (i) Pemanjangan sistem spring
Extension of system of springs
$= 2 \times 6 = 12$ cm
Jumlah panjang sistem spring
Total length of the spring system
$= 10 + 10 + 12 = 32$ cm



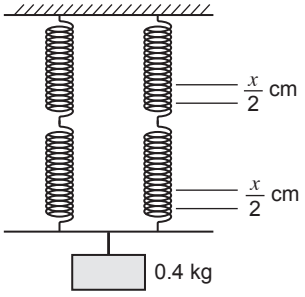
(ii) Pemanjangan sistem spring
Extension of system of springs
$= \frac{6}{2} = 3$ cm
Jumlah panjang sistem spring
Total length of the spring system
$= 10 + 3 = 13$ cm



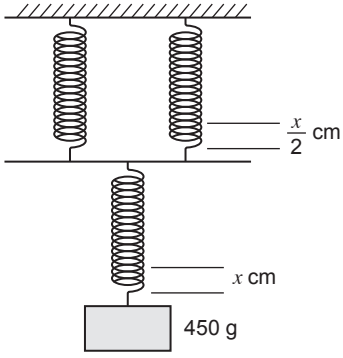
(iii) Pemanjangan sistem spring
Extension of system of springs
$= 6 + \frac{6}{2} = 9$ cm
Jumlah panjang sistem spring
Total length of the spring system
$= 10 + 10 + 9 = 29$ cm



(iv) Pemanjangan sistem spring
Extension of system of springs
$= \frac{6}{2} + \frac{6}{2} = 6$ cm
Jumlah panjang sistem spring
Total length of the spring system
$= 10 + 10 + 6 = 26$ cm



(b) Jisim 300 g memanjang spring = 6 cm
Mass of 300 g extension of spring
Jisim 450 g memanjang spring
Mass of 450 g extension of spring
$= \frac{6 \times 450}{300} = 9$ cm



Pemanjangan sistem spring
Extension of system of springs
$= \frac{9}{2} + 9 = 13.5$ cm

PRAKTIS SPM 1

KERTAS 1

Bahagian A

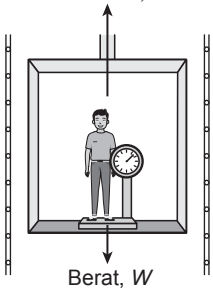
1. B	**2.** C	**3.** A	**4.** A	**5.** C
6. D	**7.** C	**8.** B	**9.** D	**10.** C
11. C	**12.** B	**13.** B		

KERTAS 2

Bahagian A

1. (a) Rajah 1.1 / *Diagram 1.1*

(b) Tindak balas normal, *R*
Normal reaction, R



Berat, *W*
Weight, W

(c) (i) 500 N

(ii) $W - R = ma$
$W - R = 50(3)$
$500 - 150 = R$
$R = 350$ N

(d) 0 N

(e) $R - W = 50(2)$
$R = 500 + 100 = 600$ N

Bahagian B

2. (a) Berat suatu objek ialah daya graviti yang bertindak ke atas objek itu.
The weight of an object is the force of gravity acting on that object.

(b) $2T\cos 30^\circ = 60$

$$T = \frac{60}{2 \times 0.866}$$

$T = 34.64$ N

Tegangan 34.64 N yang dikenakan oleh pasu bunga melebihi tegangan maksimum kabel iaitu 30 N.
The 34.64 N tension exerted by the flower pot exceeds the maximum cable tension of 30 N.

(c) (i) $s = ut + \frac{1}{2}gt^2$

$5 = 0 + \frac{1}{2}(10)t^2$
$t = 1$ s

(ii) $v^2 = u^2 + 2gs$
$v^2 = 0 + 2(10)^5$
$v = 10\ ms^{-1}$

(iii) Gunakan pasu bunga plastik.
Use plastic flower pot.

(d) (i) Sudut antara kabel perlu kecil. Daya bersih yang bertindak ke atas kereta lebih besar.
The angle between the cables should be small. The net force acting on the car is greater.

(ii) Kabel perlu kuat dan tidak kenyal. Kabel tidak putus dan daya yang besar dikenakan untuk menarik kereta.
The cable should be strong and not elastic. The cables do not break and a large force is applied to pull the car.

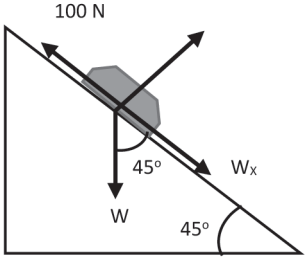
(iii) Kabel dengan tegangan yang maksimum tinggi. Kabel dapat menarik kereta dengan daya yang besar
Cable with high maximum tension. The cable can pull the car with great force.

(iv) Letakkan papan kayu di bawah tayar kereta. Supaya tayar kereta dapat bergerak di atas permukaan yang keras.
Place a wooden board under the car tyre. So that the car tyres can move on hard surfaces.

Bahagian C

3. (a) Daya yang bertindak menentang pergerakan antara dua permukaan yang bersentuhan.
Force that acts against the motion of two contact surfaces.

(b) (i)



$W_X = 300 \cos 45° = 299.3$ N

(ii) Daya paduan = (daya ke bawah selari dengan landasan curam) – (daya ke atas selari dengan landasan curam)
Resultant force = (downward force parallel with the slope) – (upward force parallel with the slope)
$= W_X$ – Daya Geseran
Frictional Force
$= 299.3 - 100$
$= 199.3$ N

(iii) $F = ma$
$199.3 = 30(a)$
$a = 6.64$ m s^{-2}

(c)
- Objek boleh meluncur turun pada sudut condong 45° kerana komponen daya ke bawah yang selari dengan landasan curam lebih besar dari daya geseran.
The object can slide downwards at an inclination angle of 45° because the downward force component parallel to the inclined plane is greater than the frictional force.
- Maka objek itu memecut ke bawah.
Therefore, the object accelerates downwards.
- Objek itu pegun pada sudut condong 15° kerana komponen daya ke bawah yang selari dengan landasan curam adalah kurang dari daya geseran.
Object stays stationary at angle of inclination 15° because the downward force component parallel to the inclined plane is smaller than the frictional force.

(d) (i) Mesin penanda garisan ditolak supaya ia boleh mengenakan daya ke bawah yang lebih besar.
Line painter machine is pushed so that it can mark the line with greater force.

(ii) Jisim mesin penanda garisan lebih besar supaya mesin penanda garisan lebih stabil.
Larger mass of the line painter machines to make the line painter machines more stable.

(iii) Saiz bekas cat lebih besar untuk menanda garis yang lebih panjang dan lama
The size of the paint container is larger to mark longer line and last longer.

(iv) Sudut antara pemegang dengan garis tegak lebih kecil untuk menghasilkan daya ke bawah yang lebih besar.
Smaller angle between the handle and the vertical line to produce bigger downward force.

- Mesin penanda garisan yang paling sesuai ialah *P* sebab mesin penanda garisan *P* lebih berat, ditolak pada sudut antara pemegang dengan garis tegak yang lebih kecil dan saiz bekas cat yang besar.
The most suitable line painter machine is P because the P line marking machine is heavier, it is pushed at an angle between the handle with a smaller angle with vertical line and a large paint container size.