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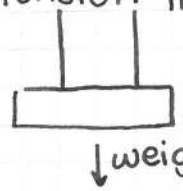
1. Tension in ropes



2. 12N. The reaction force has to equal the weight of the particle so that the resultant force is 0.

3. (a) P = 15 N

15 N − 15N = 0

(b) P = 16 N
Q = 24N

16N − 16N = 0
24N − 24N = 0

(c) P = 20N

20N − 20N = 0

if P = 20N
P + 25N = 45N

Q = 45 N

Q = P + 25N = 45N

4. (a) $2p = 3q + 1$
$p = 8N$

$2(8) = 3q + 1$
$16 = 3q + 1$
$3q = 16 - 1$
$3q = 15$

$q = \frac{15}{3} = 5$

(b) $4p - (10 + 5q) = 0$
$2p - 3q = 0$
} simultaneous equation

$4p - 5q = 10$
$2p - 3q = 0$ (x2)

$4p - 5q = 10$
$-\ 4p - 6q = 0$

$q = 10$

Sub $q = 10$

$4p - 5(10) = 10$
$4p - 50 = 10$
$4p = 10 + 50$
$4p = 60$
$p = \frac{60}{4}$

$P = 15$.

(c) $3p - 2q = 25$
$2p - q = 40$ (x2)

$-\ 3p - 2q = 25$
$4p - 2q = 80$

$-p = -55$

$p = 55$

Sub in $p = 55$

$3(55) - 2q = 25$
$165 - 2q = 25$
$165 - 25 = 2q$
$140 = 2q$
$\frac{140}{2} = q$

$q = 70$

5. (a) i. 50 − 50 = 0N
45 − 30 = 15N

15N rightwards.

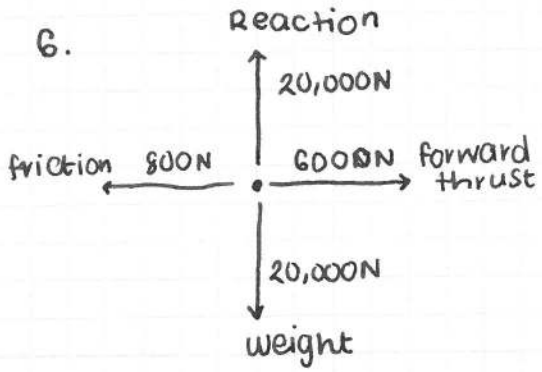
ii. The particle will accelerate to the right.

(b) i. 25 − 25 = 0N
40 − 15 = 25N

25N ↓

ii. The particle will accelerate downwards.

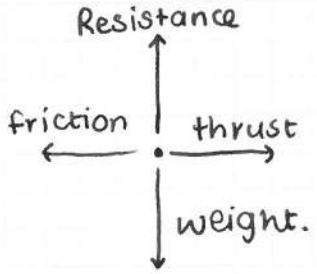
6.



(b) $6000 - 800 = 5200$

5200N

7.



(b) $T = 3F$

$T - F = 7500$

$3F - F = 7500$

$2F = 7500$

$F = 3750N$