# McRoberts Secondary

**Physics 12 Statics Retest 2025-10-22**

Personal Data

Family Name:

Given Name:

Signature:

checked

Registration Number

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| 1 | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | 1 |
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In this section **no** changes or modifications must be made!

**Scrambling** 0 0

Type: 020

Exam ID(Physics 12): 25102200002

Please mark the boxes carefully: ☒ Not marked: ☐ or ■

This document is scanned automatically. Please keep clean and do not bend or fold. For filling in the document please use a **blue or black pen**.

**Only clearly marked and positionally accurate crosses will be processed!**

Answers 1 - 15

| | a | b | c | d |
|---|---|---|---|---|
| 1 | ☐ | ☐ | ☐ | ☐ |
| 2 | ☐ | ☐ | ☐ | ☐ |
| 3 | ☐ | ☐ | ☐ | ☐ |
| 4 | ☐ | ☐ | ☐ | ☐ |
| 5 | ☐ | ☐ | ☐ | ☐ |
| 6 | ☐ | ☐ | ☐ | ☐ |
| 7 | ☐ | ☐ | ☐ | ☐ |
| 8 | ☐ | ☐ | ☐ | ☐ |
| 9 | ☐ | ☐ | ☐ | ☐ |
| 10 | ☐ | ☐ | ☐ | ☐ |
| 11 | ☐ | ☐ | ☐ | ☐ |
| 12 | ☐ | ☐ | ☐ | ☐ |
| 13 | ☐ | ☐ | ☐ | ☐ |
| 14 | ☐ | ☐ | ☐ | ☐ |
| 15 | ☐ | ☐ | ☐ | ☐ |
| | a | b | c | d |

Answers 16 - 20

| | a | b | c | d |
|---|---|---|---|---|
| 16 | ☐ | ☐ | ☐ | ☐ |
| 17 | ☐ | ☐ | ☐ | ☐ |
| 18 | ☐ | ☐ | ☐ | ☐ |
| 19 | ☐ | ☐ | ☐ | ☐ |
| 20 | ☐ | ☐ | ☐ | ☐ |
| | a | b | c | d |

1. What conditions are necessary for a body to be in static equilibrium? Note that $\sum \vec{F}$ is the net force on the body and $\sum \vec{\tau}$ is the net torque on the body.

   a. $\sum \vec{F} = 0$
   b. $\sum \vec{\tau} = 0$
   c. $\sum \vec{F} = 0$ and $\sum \vec{\tau} = 0$
   d. $\sum \vec{F} = 0$ or $\sum \vec{\tau} = 0$ (but not both)

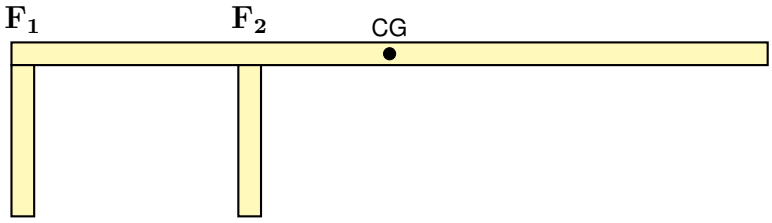
2. A heavy seesaw is out of balance. A lightweight child sits on the end that is tilted downward, and a heavy child sits on the other side so that the seesaw now balances. If both children then move forward so that they are at half of their original distance from the pivot, what will happen to the seesaw?

   a. The side the heavy child is sitting on will now tilt downward.
   b. The seesaw will still be balanced.
   c. It is impossible to determine without knowing the masses and distances.
   d. The side the lightweight child sitting on will once again tilt downward.

3. A rocket moves through outer space with a constant velocity of 9.8 m/s toward the Andromeda galaxy. What is the net force acting on the rocket?

   a. A force equal to the gravity acting on it.
   b. A force equal to its weight on Earth, $\mathrm{mg}$.
   c. The net force is zero.
   d. Cannot be determined without more information.

4. A cantilever is held in static equilibrium by two vertical supports as shown in the figure. The beam is fastened to the supports with screws so that each support could apply an upward or downward force. The centre of gravity (CG) of the beam is to the right of the second support. In which direction must $\mathbf{F_1}$ and $\mathbf{F_2}$ point to keep the beam in static equilibrium?




   a. $\mathbf{F_1}$ and $\mathbf{F_2}$ both point upward
   b. $\mathbf{F_1}$ and $\mathbf{F_2}$ both point downward
   c. $\mathbf{F_1}$ points upward while $\mathbf{F_2}$ points downward
   d. $\mathbf{F_1}$ points downward while $\mathbf{F_2}$ points upward

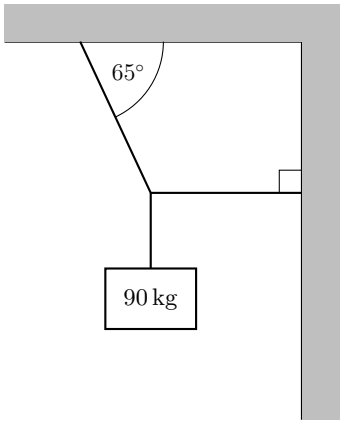
5. A person weighing 827 N stands with one foot on each of two bathroom scales. Which statement is correct about this situation?

   a. The sum of the two scale readings should be 827 N
   b. Each scale should read 827 N
   c. None of the other statements are true.
   d. Each scale should read 413.5 N

6. A heavy child and a lightweight child are balanced on a massless seesaw. If both children move forward so that they are at half of their original distance from the pivot, what will happen to the seesaw?

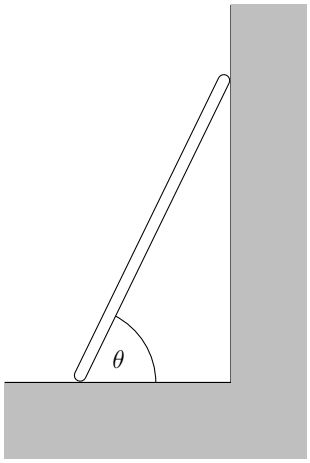
   a. The side the lightweight child is sitting on will tilt downward.
   b. It is impossible to determine without knowing the masses and distances.
   c. The seesaw will still be balanced.
   d. The side the heavy child is sitting on will tilt downward.

7. A box of mass 90 kg hangs down from three attached cords secured to the ceiling and wall as shown in the diagram. Find the maximum tension in any one of the three cords.



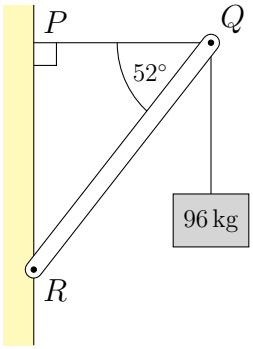

   a. 973 N
   b. 943 N
   c. 1380 N
   d. 1140 N

8. A uniform ladder of mass 1 kg and length 3 m leans against a frictionless wall. Let $\theta$ be the angle that the ladder makes with the ground. If the coefficient of static friction between the ladder and the ground is 0.28, what is the minimum value of $\theta$ at which the ladder will not slip?



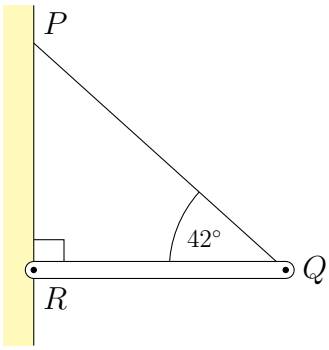

   a. 61°
   b. 53°
   c. 42°
   d. 57°

9. A uniform beam QR, 2.0 m long with negligible mass, is mounted by a hinge on a wall and held in position by a horizontal wire PQ as shown in the figure. The beam supports a load of mass 96 kg hanging vertically down from point Q. What is the tension in the horizontal wire PQ?



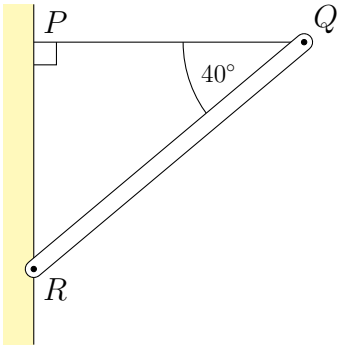

   a. 594 N
   b. 126 N
   c. 561 N
   d. 735 N

10. A 4.0 m long uniform beam of mass 8.0 kg, QR, is mounted by a hinge on a wall and held in a horizontal position by wire PQ, forming a 42° angle at point Q as shown in the figure. What is the magnitude of the tension in wire PQ?




   a. 13 N
   b. 120 N
   c. 59 N
   d. 92 N

11. A 4.0 m long uniform beam of mass 49 kg (QR) is mounted by a hinge on a wall and held in position by a horizontal wire (PQ), forming a 40° angle at point Q as shown in the figure. What is the tension in the horizontal wire PQ?

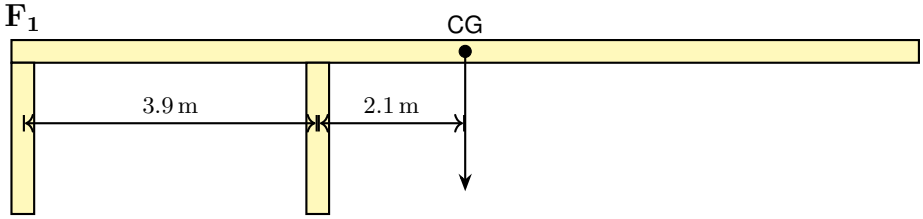



a. 28.6 N
b. 286 N
c. 245 N
d. 2860 N

12. Two scales are separated by 4.0 m, and a plank of mass 4.0 kg is placed between them. Each scale is observed to read 2.0 kg. A rock is placed somewhere on the plank, after which the left scale reads 40.0 kg and the right scale reads 90.0 kg. How far from the left scale was the rock placed?

a. 1.65 m
b. 3.9 m
c. 0.51 m
d. 2.79 m

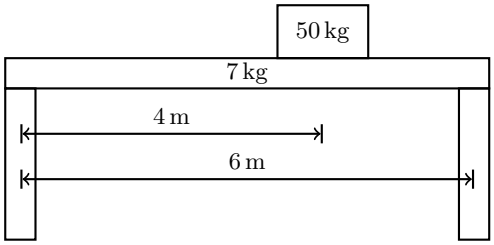
13. A cantilever beam is held in static equilibrium by two vertical supports separated by 3.9 m. The beam's mass is 52 kg and its centre of gravity (CG) is 2.1 m from the second support. What is the magnitude of the force applied by the first support, $\mathbf{F_1}$?




a. 520 N
b. 27 N
c. 270 N
d. 85 N

14. A uniform 7 kg beam, 6 m long, supports a 50 kg box. The beam is supported by two vertical columns and the centre of gravity of the box is 4 m from the left column. Calculate the force

on the right column.

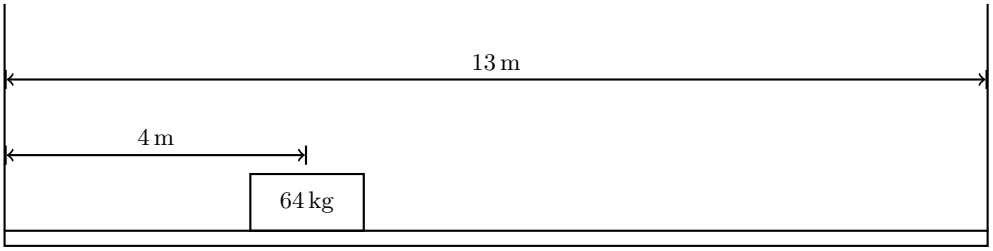



a. 254 N
b. 361 N
c. 341 N
d. 167 N

15. An object is kept in static equilibrium by three forces, $F_1$, $F_2$, and $F_3$. If $F_1 = 310$ N and $F_2 = 182$ N are separated by an angle of 139°, what is magnitude of $F_3$?

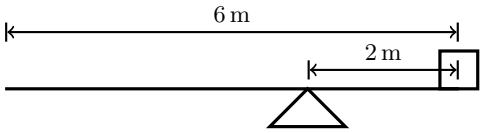
a. 210 N
b. 133 N
c. 207 N
d. 291 N

16. A scaffold of negligible mass is hanging horizontally from wires on each end. The scaffold is 13 m long. A 64 kg box sits 4 m from the left end. What is the tension in each wire?




a. left tension = 44.3 N; right tension = 19.7 N
b. left tension = 434 N; right tension = 193 N
c. left tension = 314 N; right tension = 314 N
d. left tension = 193 N; right tension = 434 N

17. A lever is 6 m long. The distance from the fulcrum to the load to be lifted is 2 m. If a worker pushes on the opposite end with 800 N, what is the maximum weight that can be lifted?

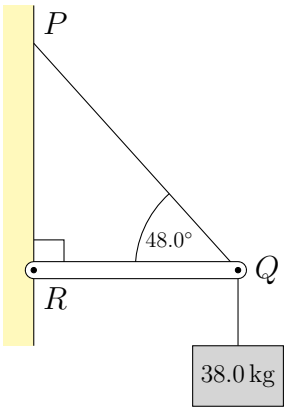



a. 1600 N
b. 267 N
c. 1200 N
d. 1850 N

18. A boy and a girl are balanced on a massless seesaw. The boy's mass is 59 kg and the girl's mass is 45 kg. If the boy is sitting 2.8 m from the pivot, how far from the pivot must the girl be sitting on the other side of the seesaw?

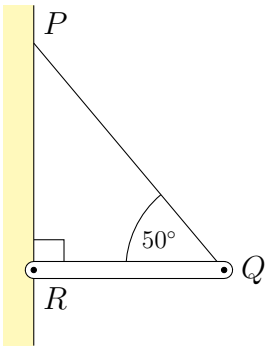
    a. 3.7 m
    b. 2.7 m
    c. 2.5 m
    d. 2.3 m

19. A 4.0 m long uniform beam of mass 6.00 kg, $\mathrm{QR}$, is mounted by a hinge on a wall and held in a horizontal position by wire $\mathrm{PQ}$, forming a 48.0° angle at point $\mathrm{Q}$ as shown in the figure. A load of mass 38.0 kg hangs vertically down from point $\mathrm{Q}$. What is the magnitude of the tension in wire $\mathrm{PQ}$?




    a. 1080 N
    b. 541 N
    c. 961 N
    d. 585 N

20. A 1.0 m long uniform beam of mass 30.0 kg, $\mathrm{QR}$, is mounted by a hinge on a wall and held in a horizontal position by wire $\mathrm{PQ}$, forming a 50° angle at point $\mathrm{Q}$ as shown in the figure. What is the magnitude of the force that the hinge exerts on the beam at point $\mathrm{R}$?




    a. 190 N
    b. 220 N
    c. 19 N
    d. 320 N