McRoberts Secondary

Sample Exam 2 2025-09-07

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Answers 1 - 15

	a	b	c	d
1	☐	☐	☐	☐
2	☐	☐	☐	☐
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9	☐	☐	☐	☐
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12	☐	☐	☐	☐
13	☐	☐	☐	☐
14	☐	☐	☐	☐
15	☐	☐	☐	☐

Answers 16 - 30

	a	b	c	d
16	☐	☐	☐	☐
17	☐	☐	☐	☐
18	☐	☐	☐	☐
19	☐	☐	☐	☐
20	☐	☐		
21	☐	☐	☐	☐
22	☐	☐	☐	☐
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24	☐	☐	☐	☐
25	☐	☐	☐	☐
26	☐	☐	☐	☐
27	☐	☐	☐	☐
28	☐	☐	☐	☐
29	☐	☐	☐	☐
30	☐	☐		

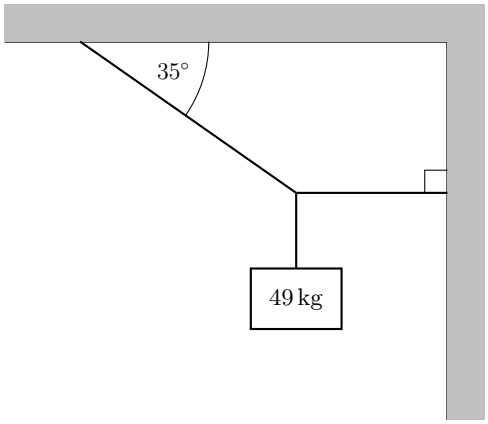
Answers 31 - 45

	a	b	c	d
31	☐	☐	☐	☐
32	☐	☐	☐	☐
33	☐	☐	☐	☐
34	☐	☐	☐	☐
35	☐	☐	☐	☐
36	☐	☐	☐	☐
37	☐	☐	☐	☐
38	☐	☐	☐	☐
39	☐	☐	☐	☐
40	☐	☐	☐	☐
41	☐	☐	☐	☐
42	☐	☐	☐	☐
43	☐	☐	☐	☐
44	☐	☐	☐	☐
45	☐	☐	☐	☐

1. A runner completes a marathon ($42.195\,\mathrm{km}$) with an average pace of $7\,\mathrm{minutes}$ and $15\,\mathrm{seconds}$ per $\mathrm{kilometre}$. What is the runner's time for the marathon? (Answers are formatted as $\mathrm{hours} : \mathrm{minutes} : \mathrm{seconds}$)

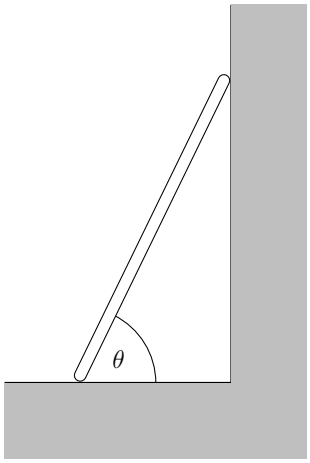
   a. $07 : 13 : 24$
   b. $06 : 17 : 30$
   c. $05 : 05 : 55$
   d. $06 : 30 : 02$

2. A box of mass $49\,\mathrm{kg}$ 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. $827\,\mathrm{N}$
   b. $837\,\mathrm{N}$
   c. $751\,\mathrm{N}$
   d. $629\,\mathrm{N}$

3. A uniform ladder of mass $5\,\mathrm{kg}$ and length $5\,\mathrm{m}$ leans against a frictionless wall. Let θ be the angle that the ladder makes with the ground. If the coefficient of static friction between the ladder and the ground is 0.25, what is the minimum value of θ at which the ladder will not slip?



   a. $53°$
   b. $63°$
   c. $43°$
   d. $33°$

4. A person weighing $552\,\mathrm{N}$ stands with one foot on each of two bathroom scales. Which statement is correct about this situation?

    a. None of the other statements are true.

    b. The sum of the two scale readings should be $552\,\mathrm{N}$

    c. Each scale should read $552\,\mathrm{N}$

    d. Each scale should read $276\,\mathrm{N}$

5. A rocket moves through outer space with a constant velocity of $9.8\,\mathrm{m/s}$ toward the Andromeda galaxy. What is the net force acting on the rocket?

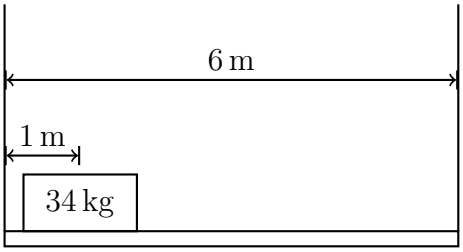
    a. A force equal to its weight on Earth, mg.

    b. A force equal to the gravity acting on it.

    c. The net force is zero.

    d. Cannot be determined without more information.

6. A scaffold of negligible mass is hanging horizontally from wires on each end. The scaffold is $6\,\mathrm{m}$ long. A $34\,\mathrm{kg}$ box sits $1\,\mathrm{m}$ from the left end. What is the tension in each wire?



    a. left tension = $167\,\mathrm{N}$; right tension = $167\,\mathrm{N}$

    b. left tension = $278\,\mathrm{N}$; right tension = $55.5\,\mathrm{N}$

    c. left tension = $28.4\,\mathrm{N}$; right tension = $5.66\,\mathrm{N}$

    d. left tension = $55.5\,\mathrm{N}$; right tension = $278\,\mathrm{N}$

7. A car traveling at speed v is able to stop in a distance d. Assuming the same constant acceleration, what distance does this car require to stop when it is traveling at speed $9v$?

    a. $9d$

    b. d

    c. $81d$

    d. $\sqrt{9}d$

8. True or false? It is possible to have zero acceleration and still be moving.

    a. True

    b. False

9. A boy and a girl are balanced on a massless seesaw. The boy's mass is $47\,\mathrm{kg}$ and the girl's mass is $38\,\mathrm{kg}$. If the boy is sitting $1.6\,\mathrm{m}$ from the pivot, how far from the pivot must the girl be sitting on the other side of the seesaw?

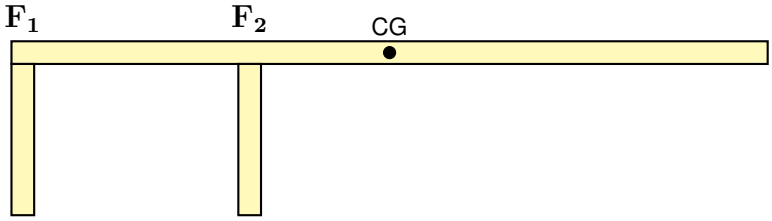
    a. $1.8\,\mathrm{m}$

    b. $2.0\,\mathrm{m}$

    c. $1.6\,\mathrm{m}$

    d. $1.4\,\mathrm{m}$

10. 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?

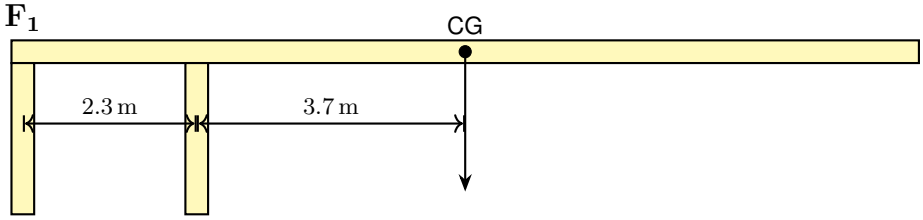


    a. $\mathbf{F_1}$ and $\mathbf{F_2}$ both point upward
    b. $\mathbf{F_1}$ and $\mathbf{F_2}$ both point downward
    c. $\mathbf{F_1}$ points upward while $\mathbf{F_2}$ points downward
    d. $\mathbf{F_1}$ points downward while $\mathbf{F_2}$ points upward

11. The acceleration of gravity on the Moon is one-sixth of that on Earth. If you hit a baseball on the Moon with the same speed and angle that you would on Earth, the ball would land

    a. the same distance away
    b. one-sixth as far
    c. 6 times as far
    d. 36 times as far

12. A cantilever beam is held in static equilibrium by two vertical supports separated by $2.3\,\mathrm{m}$. The beam's mass is $65\,\mathrm{kg}$ and its centre of gravity (CG) is $3.7\,\mathrm{m}$ from the second support. What is the magnitude of the force applied by the first support, $\mathbf{F_1}$?

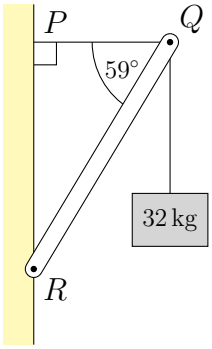


    a. $600\,\mathrm{N}$
    b. $1800\,\mathrm{N}$
    c. $100\,\mathrm{N}$
    d. $1000\,\mathrm{N}$

13. Suppose an object travels at a constant velocity of $2.05\,\mathrm{m/s}$. How much time would it take for the object to travel a distance of $71.1\,\mathrm{m}$?

    a. $0.03\,\mathrm{s}$
    b. $15.3\,\mathrm{s}$
    c. $146\,\mathrm{s}$
    d. $34.7\,\mathrm{s}$

14. A uniform beam QR, $1.0\,\mathrm{m}$ 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 $32\,\mathrm{kg}$ hanging vertically down from point Q. What is the magnitude of the force on the hinge at point R?



a. $3180\,\mathrm{N}$
b. $3000\,\mathrm{N}$
c. $366\,\mathrm{N}$
d. $3200\,\mathrm{N}$

15. What is the magnitude of the average velocity of a runner who completes one lap around an outdoor track ($400\,\mathrm{m}$) in $100\,\mathrm{s}$?

a. $0\,\mathrm{m/s}$
b. $0.25\,\mathrm{m/s}$
c. $4.0\,\mathrm{m/s}$
d. $4.0 \times 10^4\,\mathrm{m/s}$

16. An F1 car accelerates from 0 to 60 miles per hour in $2.1\,\mathrm{s}$. What is the acceleration of the car in SI base units? ($1\,\mathrm{mile} = 1609.34\,\mathrm{m}$)

a. $10.9\,\mathrm{m/s^2}$
b. $12.8\,\mathrm{m/s^2}$
c. $28.6\,\mathrm{m/s^2}$
d. $6.77\,\mathrm{m/s^2}$

17. A $5\,\mathrm{kg}$ ball and a $10\,\mathrm{kg}$ ball are both dropped off a cliff at the same time. If air drag can be ignored, then the $10\,\mathrm{kg}$ ball falls

a. $50\,\%$ faster than the $5\,\mathrm{kg}$ ball.
b. with double the velocity of the $5\,\mathrm{kg}$ ball.
c. with double the acceleration of the $5\,\mathrm{kg}$ ball.
d. with the same acceleration as the $5\,\mathrm{kg}$ ball.

18. What is the maximum height reached by a ball thrown straight up with an initial velocity of $32.7\,\mathrm{m/s}$? Assume that the ball is thrown on the surface of the Earth and that it undergoes constant acceleration due to gravity (ignore air resistance).

a. $54.6\,\mathrm{m}$
b. $33.2\,\mathrm{m}$
c. $30.4\,\mathrm{m}$
d. $31.6\,\mathrm{m}$

19. Can an object's velocity change direction when its acceleration is constant?

a. No, because the object is always speeding up.
b. No, because the object is always speeding up or slowing down, but it can never turn around.
c. Yes, a rock thrown straight up is an example.
d. Yes, a car that starts from rest, speeds up, slows to a stop, and then backs up is an example.

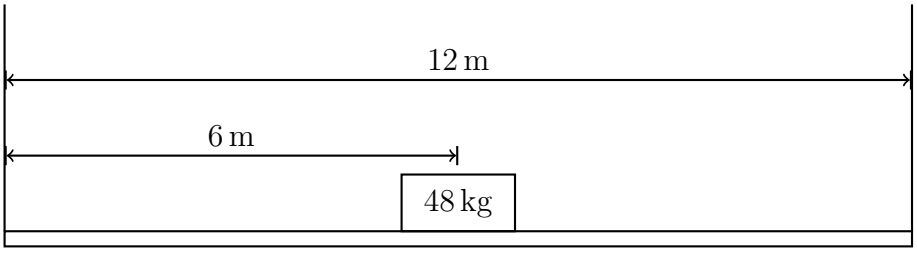
20. True or false? When you throw a ball to your friend, the ball's acceleration is zero when it reaches its maximum height.

    a. True
    b. False

21. Which of the following is a scalar quantity?

    a. speed
    b. velocity
    c. displacement
    d. acceleration

22. A scaffold of negligible mass is hanging horizontally from wires on each end. The scaffold is $12\,\mathrm{m}$ long. A $48\,\mathrm{kg}$ box sits $6\,\mathrm{m}$ from the left end. What is the tension in the left wire?



    a. $14\,300\,\mathrm{N}$
    b. $235\,\mathrm{N}$
    c. $105\,000\,\mathrm{N}$
    d. $199\,\mathrm{N}$

23. Ball 1 is dropped from the top of a building. One second later, ball 2 is dropped from the same building. If air resistance can be ignored, then as time progresses (and while the balls are still in free fall), the difference in their speeds

    a. increases.
    b. remains constant.
    c. decreases.
    d. cannot be determined from the given information.

24. Suppose that several projectiles are launched. Which one will be in the air for the longest time?

    a. The one with the furthest horizontal range.
    b. The one with the greatest maximum height.
    c. The one with the greatest initial speed.
    d. None of the above.

25. What is stress?

    a. The strain per unit length.
    b. The applied force per cross-sectional area.
    c. The ratio of the change in length to the original length.
    d. The same as force.

26. Two displacement vectors have magnitudes of $5\,\mathrm{m}$ and $7\,\mathrm{m}$, respectively. When these two vectors are added, the magnitude of the sum

    a. is larger than $12\,\mathrm{m}$
    b. is $12\,\mathrm{m}$
    c. is $2\,\mathrm{m}$
    d. could be as small as $2\,\mathrm{m}$, or as large as $12\,\mathrm{m}$

27. What is the magnitude of the slope of a position-time graph?

    a. displacement
    b. velocity
    c. rate
    d. speed

28. A car travels $42\,\mathrm{km}$ at $33\,\mathrm{km/h}$ and $177\,\mathrm{km}$ at $108\,\mathrm{km/h}$. What is the average speed for this trip?

    a. $83\,\mathrm{km/h}$
    b. $75\,\mathrm{km/h}$
    c. $89\,\mathrm{km/h}$
    d. $47\,\mathrm{km/h}$

29. Which of the following are vectors? *Select all that apply.*

    a. speed
    b. acceleration
    c. distance
    d. velocity

30. True or false? When a ball is thrown straight up, its velocity at the top is zero.

    a. True
    b. False

31. Identify the following quantity as being either a scalar or a vector: $28\,^\circ\mathrm{C}$

    a. scalar
    b. vector
    c. both scalar and vector
    d. neither scalar nor vector

32. An object is released from rest and falls straight down without friction. Which of the following is true concerning its motion?

    a. Its acceleration is constant.
    b. Its velocity is constant.
    c. Neither its acceleration nor its velocity is constant.
    d. Both its acceleration and its velocity are constant.

33. Two balls are thrown from the top of a building. One is thrown straight up while the other is thrown straight down, both with same initial speed. If air resistance can be ignored, how do their speeds compare when they hit the ground?

    a. The ball thrown up is going faster.
    b. The ball thrown down is going faster.
    c. Both balls are going the same speed.
    d. It is impossible to determine with the given information.

34. Which of the following is a vector quantity?

    a. acceleration
    b. speed
    c. distance
    d. time

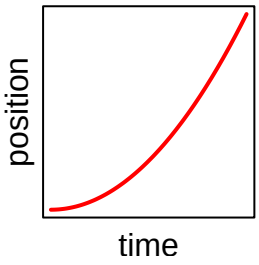
35. An object is moving to the left and speeding up. Which choice best describes its velocity and acceleration? (Assume right is positive.)

    a. velocity is positive; acceleration is negative.
    b. velocity is negative; acceleration is positive.
    c. velocity and acceleration are both positive.
    d. velocity and acceleration are both negative.

36. Consider a ball that is thrown upwards and which then falls back down. If up is the positive direction, then the ball's acceleration

    a. is always positive.
    b. is always negative.
    c. starts positive, then becomes negative.
    d. starts negative, then becomes positive.

37. Which choice best matches the given position-time graph? Assume that position is increasing to the right.



    a. moving to the right and speeding up.
    b. moving to the right and slowing down.
    c. moving to the left and speeding up.
    d. moving to the left and slowing down.

38. A scalar quantity is fully described by

    a. magnitude alone
    b. direction alone
    c. both magnitude and direction
    d. none of these

39. A ball is thrown straight up, reaches a maximum height, then falls back down to its initial height. Which of the following is true while the ball is going up?

    a. Its velocity and acceleration both point up.
    b. Its velocity and acceleration both point down.
    c. Its velocity points up while its acceleration points down.
    d. Its velocity points down while its acceleration points up.

40. 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 heavy child is sitting on will 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 is sitting on will tilt downward.

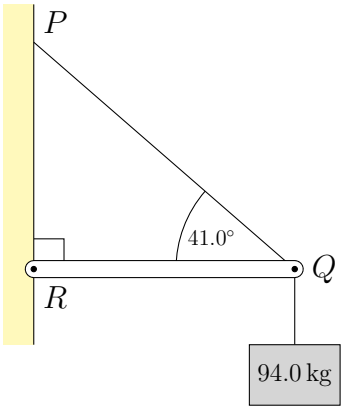
41. How many seconds would it take the Sun's light to reach Earth? The speed of light in vacuum is $3.00 \times 10^8\,\mathrm{m/s}$. The Sun is $1.5 \times 10^{11}\,\mathrm{m}$ from the Earth.

    a. $0\,\mathrm{s}$
    b. $2.0 \times 10^{-3}\,\mathrm{s}$
    c. $5.0 \times 10^{2}\,\mathrm{s}$
    d. $4.5 \times 10^{19}\,\mathrm{s}$

42. A runner completes a marathon ($42.195\,\mathrm{km}$) in $5\,\mathrm{hours}$, $1\,\mathrm{minutes}$, and $51\,\mathrm{seconds}$. What is the runner's average speed for the marathon in $\mathrm{m/s}$?

    a. $2.1\,\mathrm{m/s}$
    b. $3.62\,\mathrm{m/s}$
    c. $2.33\,\mathrm{m/s}$
    d. $0.73\,\mathrm{m/s}$

43. A $3.0\,\mathrm{m}$ long uniform beam of mass $5.00\,\mathrm{kg}$, QR, is mounted by a hinge on a wall and held in a horizontal position by wire PQ, forming a 41.0° angle at point Q as shown in the figure. A load of mass $94.0\,\mathrm{kg}$ hangs vertically down from point Q. What is the magnitude of the tension in wire PQ?



    a. $144\,\mathrm{N}$
    b. $2880\,\mathrm{N}$
    c. $167\,\mathrm{N}$
    d. $1440\,\mathrm{N}$

44. A book weighs $8\,\mathrm{N}$ at the surface of the Earth. When held at rest on top of your head, the net force on the book is

    a. $0\,\mathrm{N}$
    b. $8\,\mathrm{N}$
    c. $-8\,\mathrm{N}$
    d. $9.8\,\mathrm{N}$

45. Two scales are separated by $6.0\,\mathrm{m}$, and a plank of mass $4.0\,\mathrm{kg}$ is placed between them. Each scale is observed to read $2.0\,\mathrm{kg}$. A rock is placed somewhere on the plank, after which the left scale reads $50.0\,\mathrm{kg}$ and the right scale reads $80.0\,\mathrm{kg}$. How far from the left scale was the rock placed?

    a. $5.2\,\mathrm{m}$

    b. $3.7\,\mathrm{m}$

    c. $5.3\,\mathrm{m}$

    d. $4.6\,\mathrm{m}$