MHS

Physics

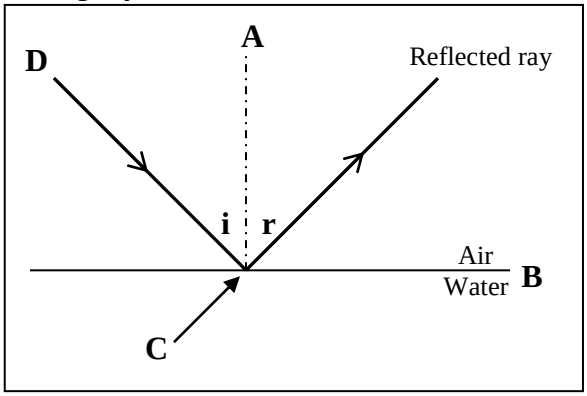
Exam to go from grade 10 to grade 11

Sample Questions

1. A non-luminous source of light is one which:
    1. emits light by itself
    2. carries light inside
    3. reflects light coming from other objects

2. A ray of light is:
    1. The straight line we imagine light propagating along
    2. The sun
    3. The wavy line we imagine light propagates along

3. The diagram below shows the reflection of light from a surface. What name do we give to the incoming ray, **D**, that strikes the surface of the water?



    1. Reflected ray
    2. Striking ray
    3. Incident ray

4. A rough surface reflects light in all directions. What type of reflection is this called?
    1. Spectacular
    2. Smooth
    3. Diffuse

5. A ray of light strikes a plane mirror with an angle of incidence, i, of 55^{o}. At what angle of reflection, r, will the ray reflect from the surface?
    1. 68^{o}
    2. 55^{o}
    3. 51^{o}

6. To find the image of a point object how many rays of light from the object should we consider?
    1. At least two
    2. At least nine
    3. We don't need any

7. What are the properties of the image of a real extended object in a plane mirror? **(For each choice say <u>True</u> or <u>False</u>)**
    1. Real
    2. Larger in size
    3. Asymmetric (not symmetric)
    4. Smaller in size
    5. Unique
    6. Virtual
    7. Larger in size
    8. Symmetric
    9. Same size

8. What can we say about the way light travels in different transparent media?
    1. Light cannot travel in transparent media
    2. Light travels at different speeds in different transparent media
    3. Light cannot pass from one transparent medium to another

9. What is the index of refraction?
    1. The ratio of the speed of light in a vacuum to the speed of light in the medium
    2. The ratio of the angle of incidence to the angle of refraction
    3. The ratio of the angle of refraction to the speed of light in a vacuum

10. Given two transparent media, A and B, where B is optically denser than A, which of the following is/are true? **(For each choice say <u>True</u> or <u>False</u>)**
    1. Light will travel slower in B than it does in A
    2. Light will travel faster in B than it does in A
    3. Light will travel faster in A than it does in B

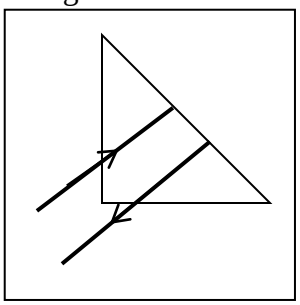
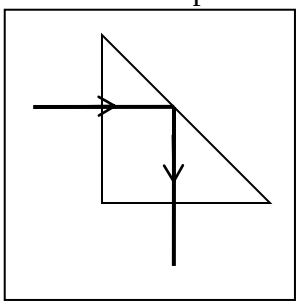
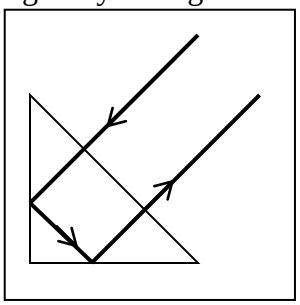
11. What is refraction?
    1. Refraction is the creation of laser light
    2. Refraction is the breaking-up of light into different colours
    3. Refraction is the bending of light as it goes from one transparent medium into another

12. How can we express the relative index of refraction for two media, I and R, given the angle of incidence, *i*, in medium I and the angle of refraction, *r*, in medium R?
    1. $n_{RI} = \frac{v}{c}$
    2. $n_{RI} = \frac{\sin i}{\sin r}$
    3. $n_{RI} = \frac{\sin r}{\sin i}$

13. Why is the reflection that occurs at the boundary between two transparent media called internal reflection?
    1. To indicate that light stays in the medium of incidence
    2. To indicate that light disappears at the boundary
    3. To indicate that light enters the medium of refraction

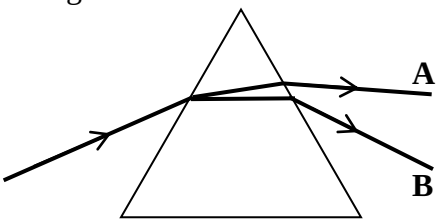
14. What is the Critical Angle for light travelling from a transparent medium into a less dense medium?
    1. The angle of refraction that will give an angle of incidence of 90^o
    2. The angle of incidence that will give an angle of refraction of 90^o
    3. The angle of refraction that will give an angle of incidence of 0^o

15. Which diagram below correctly shows how to use a prism to turn a light ray through 180^o?

1. 
2. 
3. 

16. What phenomenon occurs at the core-cladding boundary inside an optical fiber?
    1. Dispersion
    2. Refraction
    3. Total internal reflection

17. The diagram below illustrates the dispersion of light in a prism. What are the colors at A and B?



Color at **A**: 1. Red 2. Green 3. Blue 4. Yellow
Color at **B**: 1. Green 2. Violet 4. Red 4. Orange

18. A converging lens is typically a:
    1. Thick-edged lens
    2. Opaque lens
    3. Thin-edged lens

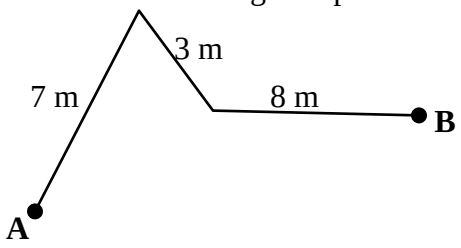
19. What distance separates the optical center of a lens and its principal focus?
    1. 22cm
    2. Focal length
    3. 5cm

20. In what way(s) can we view a real image created by a lens?
    1. Focused on a screen only
    2. Focused on a screen or by placing our eyes in the path of the beam beyond the point image
    3. By placing our eyes in the path of the beam beyond the point image only

21. Which of the following rays can we **not** use to help us locate the image from a lens?
    1. Ray passing through the focal length and emerging from the lens parallel to the principal axis
    2. Ray entering the lens at an angle θ without passing through the principal focus and emerging from the lens at an angle ω to the principal axis
    3. Ray entering the lens parallel to the principal axis to emerge and pass through the principal focus

22. Which of the following is **not** a vector quantity?
    1. 22 kg of mass
    2. 0.3 N Right
    3. 22 ms^{-1} North

23. Calculate the length of path traveled by a body moving from A to B in the diagram below.



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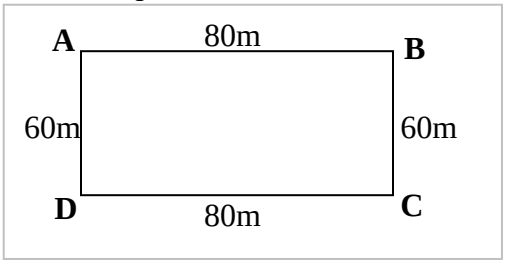
24. From the diagram below, a bird flies straight from point A to point D. What is the magnitude of the bird's displacement?



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25. Using the diagram below, a man runs from A to B to C to D in a time of 10 s. What is the man's average speed?

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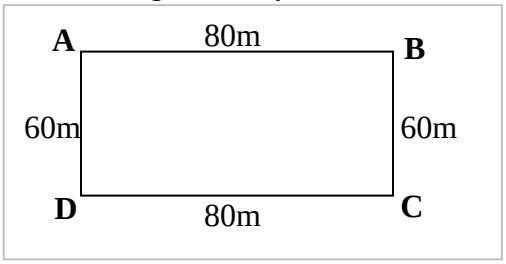
26. Using the diagram below, a falcon flies directly from A to C in a time of 20 s, what is the falcon's average velocity?



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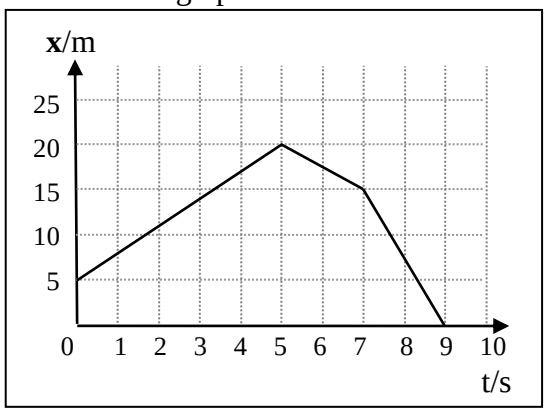
27. A lady is driving her car and at exactly 3.25 pm looks at her speedometer and sees her speed is 88 km/h. What is this speed called?
    1. Average speed
    2. Instantaneous speed
    3. Fast

28. What is instantaneous velocity?
    1. Average velocity over a specific time interval
    2. Instantaneous speed in a specific direction
    3. Instantaneous speed

29. What is average acceleration?
    1. The change in the displacement of a body over a given time interval
    2. The change in the speed of a body over a given time interval
    3. The change in the velocity of a body over a given time interval

30. From the graph below what is the average velocity in the time interval 0 s to 5 s.



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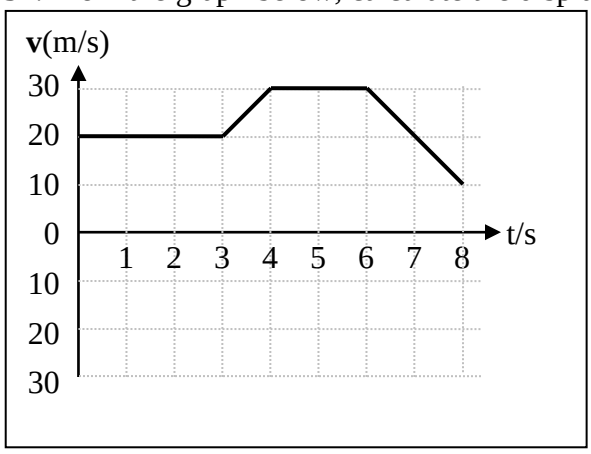
31. On a **v**-t graph, what do we find from the slope of the line joining two points?

1. Position
2. Average Acceleration
3. Average velocity
4. Displacement
5. Instantaneous velocity

32. From the graph below, calculate the displacement of the body in the time interval 3 s to 4 s.



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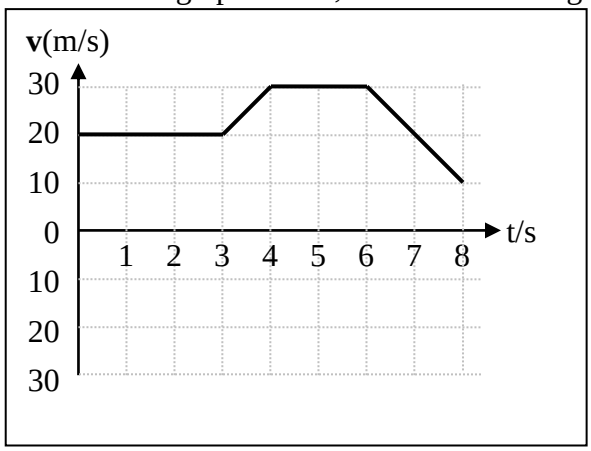
33. From the graph below, what is the average acceleration of the body from 0 s to 5 s?



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34. What is the formula for Uniform Rectilinear Motion (URM)?
    1. $\mathbf{x} = \mathbf{v}t + \mathbf{x}_0$
    2. $\mathbf{x}_0 = \mathbf{x}t$
    3. $\mathbf{x}_0 = \mathbf{x}t + \mathbf{v}$

35. A car initially travelling at a speed of 14 ms^{-1} accelerated uniformly at 4 ms^{-2} for 10 s. Calculate the distance covered by the car.

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36. A lemon falls from a lemon tree and hits the ground with a velocity of 4 m/s. If the acceleration due to gravity is 10 m/s^2 then how far did the lemon fall?

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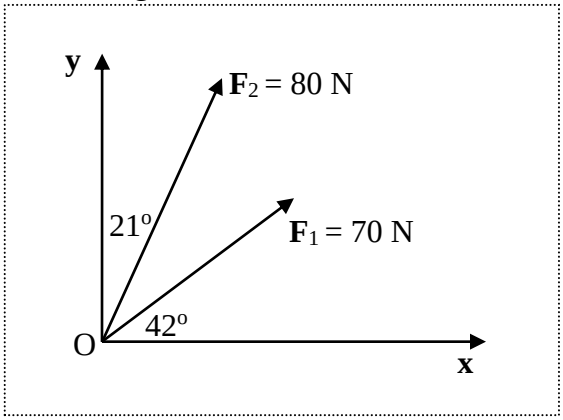
37. All forces are a result of: **(select one correct answer)**
    1. Extreme cold
    2. Two objects interacting
    3. A boy kicking a ball

38. Forces can be placed into two categories. What are they? **(select one correct answer)**
    1. Interacting forces and non-interacting forces
    2. Action at-a-distance forces and contact forces
    3. Magnetic and light forces

39. To bring a car to a stop the key force is: **(select one correct answer)**
    1. Magnetism
    2. Friction
    3. Acceleration

40. What is weight? **(select one correct answer)**
    1. Weight is the same as mass
    2. Weight is the push of the sun
    3. Weight is the pull of gravity

41. From the diagram below, calculate $\mathbf{F}_1+\mathbf{F}_2$, the sum of forces $\mathbf{F}_1$ and $\mathbf{F}_2$.



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42. What does Newton's Third law state? **(select one correct answer)**
    1. For every action there is an equal and opposite reaction
    2. For every action there is zero reaction
    3. None of the above

43. Newton's first law states that an object continues in a state of rest or motion at a constant speed until what happens? **(select one correct answer)**
    1. It is acted upon by an unbalanced force
    2. It is acted upon by a balanced force
    3. It is given more energy

44. A football of mass 5 kg is hit with a force **F**. If the ball accelerates at 0.5 ms^{-2} then what force was the ball hit with?

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45. Which formula below is described by Newton's Universal Law of Gravitation? **(select one correct answer)**
    1. $F_g = G\frac{m_1 m_2}{r^4}$
    2. $F_g = G\frac{m_1 m_2}{r^2}$
    3. $F_g = \frac{m_1 m_2}{r^2}$

46. What do we call a material that can restore its shape? **(select one correct answer)**
    1. Plastic
    2. Metal
    3. Soft
    4. Elastic

47. What does Hooke's Law state? **(select one correct answer)**
    1. Provided the stretching force extends a spring beyond its elastic limit, the extension of the spring is directly proportional to the stretching force
    2. Provided the stretching force extends a spring beyond its elastic limit, the extension of the spring is inversely proportional to the square of the stretching force
    3. Provided the stretching force does not extend a spring beyond its elastic limit, the extension of the spring is directly proportional to the stretching force

48. Which formula correctly describes momentum? [**p** = momentum; m = mass; and **v** = velocity.] **(select one correct answer)**
    1. $\mathbf{p} = m\mathbf{v}$
    2. $\mathbf{p} = \frac{m}{\mathbf{v}}$
    3. $\mathbf{p} = \frac{\mathbf{v}}{m}$

49. If two bodies collide then what can we say about the total momentum before the collision and the total momentum after the collision? **(select one correct answer)**
    1. The total momentum before is greater than the total momentum after
    2. The total momentum before is smaller than the total momentum after
    3. The total momentum before is equal to the total momentum after

50. A body A of mass 180 kg is travelling at 4 ms^{-1} North when another body B of mass 60 kg travelling at 6 ms^{-1} North collides with it. After the collision the velocity of body A is 2 ms^{-1} north and the velocity of body B is $\mathbf{v_B}$. Find the velocity of **body B** after the collision.

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51. Which of the formulae below can we use to calculate impulse?
[**F** = Force; t = time; **p** = momentum; m = mass; **u** = initial velocity; and **v** = final velocity.]
(for each one say <u>yes</u> or <u>no</u>)
    1. Impulse = **F**.t
    2. Impulse = Δ**p**
    3. Impulse = m.Δ**v**
    4. Impulse = m(**v**-**u**)

52. A body experiences an impulse of magnitude 72000 $kg.ms^{-1}$ in a time of 6 s. What was the magnitude of the force exerted on the body?

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