

Science, Technology, Engineering and Mathematic Schools

Second midterm Exam

2016 – 2017

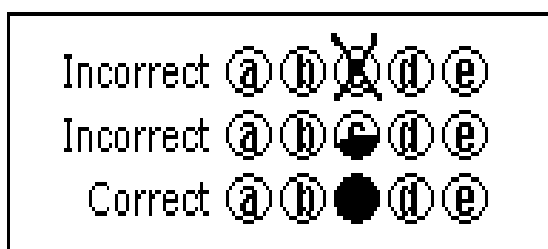
Subject: Mechanics

Grade 10

Time: 60 minutes

Instructions

- Use **Blue** ink, ballpoint pen or pencil.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You need to ensure that you fill in the entire box like the example:



Information

- You can use the **BLANK PAGE** at the end of the questions as draft papers.
- Candidates may use a scientific calculator.

Advice

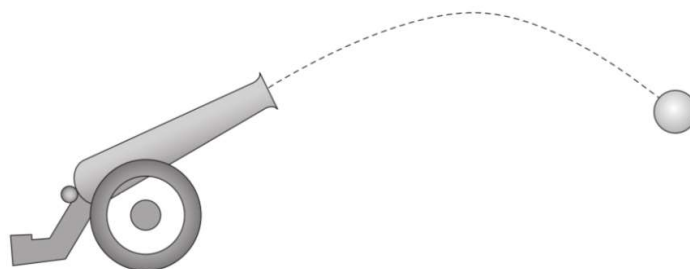
- Read each question carefully before you start to answer it.
- Keep an eye on the time. Try to answer every question.
- If you do not know the answer to a question, go on to the next question. You may come back to the skipped question later if you have time.
- Check your answers if you have time at the end.

GO ON TO THE NEXT PAGE

1

1.05

This diagram shows the path of a cannonball, fired from a cannon.



Which set of vectors represents the horizontal and vertical components of the cannonball's velocity along the path?

	Horizontal	Vertical
A-	→ → → →	↓ ↓ ↑ ↑
B-	→ → → →	↑ ↑ ↓ ↓
C-	→ → → →	↓ ↓ ↓ ↓
D-	→ → → →	↑ ↑ ↑ ↑

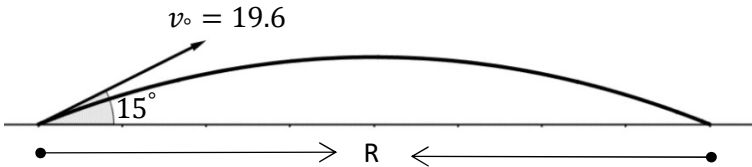
2

1.05

A ball of mass m is moving horizontally with speed v_0 off a cliff of height h , as shown. How much time does it take the ball to travel from the edge of the cliff to the ground?



A-	$\sqrt{hv_0}$
B-	$\frac{h}{v_0}$
C-	$\frac{hv_0}{g}$
D-	$\sqrt{\frac{2h}{g}}$

3	1.05
A body is projected with velocity 19.6 m/s at 30° with the horizontal, then the range $R =$	
	
A-	9.8 m
B-	19.6 m
C-	$19.6 \cos 15\text{ m}$
D-	10.15 m

4	1.05
A baseball is thrown horizontally from a cliff. At the same instant, a bowling ball is dropped from the same height. Assuming air resistance can be ignored, which of the following statements is correct?	
A-	The bowling ball hits the ground first
B-	Both the bowling ball and the baseball hit the ground at the same time.
C-	The baseball has the greater acceleration just before it hit the ground
D-	The bowling ball has the greater velocity just before it hit the ground

5	1.05
Two stones are projected from the same point with same speed making angles $45^\circ + \theta$ and $45^\circ - \theta$ with the horizontal respectively. If $\theta < 45^\circ$, then the horizontal ranges of the two stones are in the ratio of	
A-	1:1
B-	1:2
C-	1:3
D-	1:4

6	1.05
Assume that same ball is thrown at two angles 50° and 80° from the ground with initial velocity of 12 m/s. (1) At which angle the ball covers the maximum distance? (2) What is the maximum distance covered by the ball?	
	
A-	50° , 14.45 m
B-	50° , 11.24 m
C-	80° , 50.33 m
D-	80° , 16.26 m

A hunter takes an aim at a monkey sitting on a tree and fires a bullet. Just when the bullet leaves barrel of the gun, it so happens that the monkey begins to fall freely. The bullet will

A- go above the monkey

B- go below the monkey

C- hit the monkey

D- may or may not hit the monkey. It will depend upon the velocity of the bullet.

A ball is projected horizontally with a speed v from the top of a plane inclined at an angle 45° with the horizontal. How far from the point of projection will the ball strike the plane?

A- $\frac{v^2}{g}$

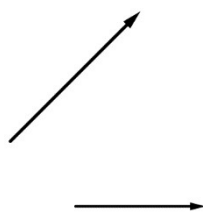
B- $\sqrt{2} \frac{v^2}{g}$

C- $\frac{2v^2}{g}$

D- $2\sqrt{2} \frac{v^2}{g}$

9	1.06
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The direction of the resultant of the two forces shown below



A-	
B-	
C-	
D-	

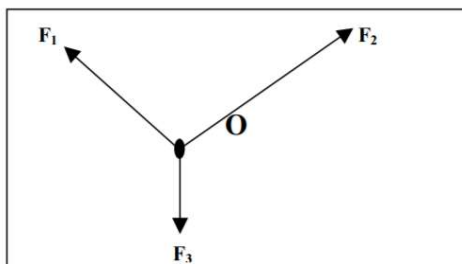
10	1.06
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The measure of the angle between the two forces $\vec{F_1}, \vec{F_2}$ is α

And $\|\vec{F_1} + \vec{F_2}\| = \|\vec{F_1} - \vec{F_2}\|$, then $\alpha =$

A-	Zero
B-	45°
C-	90°
D-	180°

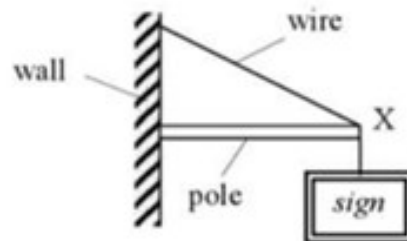
Three forces $\vec{F}_1$, $\vec{F}_2$ and $\vec{F}_3$ act simultaneously on object O, which is in equilibrium.



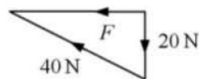
Which ONE of the following statements is NOT TRUE with reference to the three forces?

A-	The resultant of forces $\vec{F}_1$, $\vec{F}_2$ and $\vec{F}_3$ is zero.
B-	The forces $\vec{F}_1$, $\vec{F}_2$ and $\vec{F}_3$ lie in the same plane.
C-	Force $\vec{F}_1$ is the resultant of forces $\vec{F}_2$ and $\vec{F}_3$.
D-	The sum of the components of all forces in any chosen direction is zero.

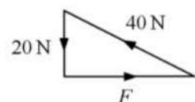
A sign of weight 20N is suspended from a pole, which is attached to a wall and kept in equilibrium by a wire, as shown. The forces exerted by the pole at X is F , and the tension in the wire is 40N. which of the following diagram correctly represents the three forces acting at point X ?



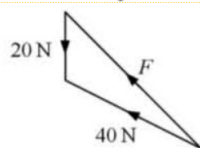
A-



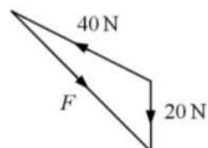
B-



C-



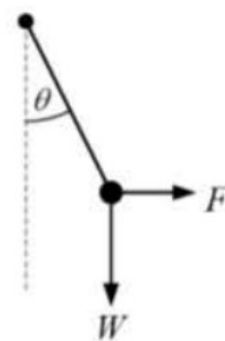
D-



13

1.06

A small ball of weight W is suspended at the end of a light string. The given diagram shows a strong horizontal wind exerting a constant force F on the ball, causing the string to make an angle θ with the vertical.



Which expression shows the correct relationship between θ , F and W ?

A- $\cos\theta = \frac{F}{W}$

B- $\sin\theta = \frac{F}{W}$

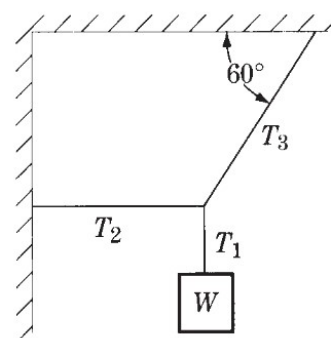
C- $\tan\theta = \frac{F}{W}$

D- $\tan\theta = \frac{W}{F}$

14

1.06

A system in equilibrium consists of an object of weight W that hangs from three ropes, as shown above. The tensions in the ropes are T_1 , T_2 and T_3 . Which of the following are correct values of T_2 and T_3 ?



A- $\frac{T_2}{W \tan 60^\circ}$, $\frac{T_3 \cos 60^\circ}{W}$

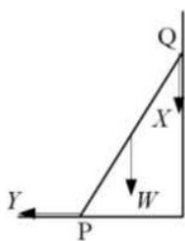
B- $W \tan 60^\circ$, $\frac{W}{\sin 60^\circ}$

C- $\frac{W}{\tan 60^\circ}$, $\frac{W}{\cos 60^\circ}$

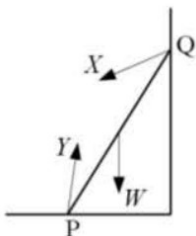
D- $\frac{W}{\tan 60^\circ}$, $\frac{W}{\sin 60^\circ}$

A ladder PQ of weight W is resting on a rough floor and Leaning against a rough wall. It is on the point of slipping and the contact forces exerted on the ladder by the wall and the floor are X and Y respectively. Which diagram most closely shows the direction of these forces?

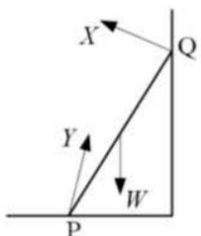
A-



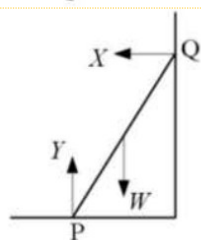
B-



C-



D-



16	1.06
If the sum of all the forces acting on a body is zero, it may be concluded that the body	
A-	Must be in equilibrium
B-	Cannot be in equilibrium
C-	May be in equilibrium provided the forces are concurrent
D-	May be in equilibrium provided the forces are parallel

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