## 2

## **SECTION A**

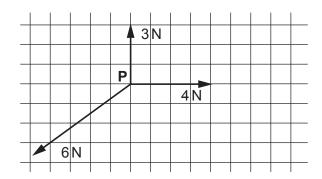
## You should spend a maximum of 40 minutes on this section.

## Write your answer for each question in the box provided.

Answer **all** the questions.

1	Which pair contains one vector and one scalar quantity?							
	Α	velocity	acceleration					
	В	displacement	force					
	С	kinetic energy	work done					
	D	momentum	distance					
	You	r answer			[1]			
2	The	unit of electrical resistance	is the ohm $\Omega.$ 1 $\Omega$ is the same	as				
	<b>A</b> $1 \text{ C V}^{-1}$							
	В	1 S <sup>-1</sup>						
	С	$1 C^2 J^{-1} s^{-1}$						
	D	$D = 1 \text{ A V}^{-1}$						
	You	r answer			[1]			
3	Whi	Which quantity is followed by a reasonable estimate of its order of magnitude?						
	Α	weight of an apple		10 <sup>0</sup> N				
	В	volume of a table tennis ba	II	10 <sup>3</sup> cm <sup>3</sup>				
	С	wavelength of infra-red rad	iation	10 <sup>4</sup> m				
	D	temperature of Sun's surface	ce	10 <sup>5</sup> K				
	You	r answer			[1]			

11 The three forces in this vector diagram act in one plane on an object P.



What is the magnitude and direction of the resultant?

- **A** 1N
- B 1N /
- **C** 1N -
- **D** 11 N /

Your answer		[1]
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**12** A car travelling at  $10 \,\mathrm{m\,s}^{-1}$  is brought to rest in a braking distance of  $10 \,\mathrm{m}$ .

Using the same average braking force, in what distance can the car be brought to rest from a speed of  $40\,\mathrm{m\,s}^{-1}$ ?

- **A** 20 m
- **B** 40 m
- **C** 80 m
- **D** 160 m

Your answer		[1]
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3 This question is about the force on a sail of a land yacht, a small vehicle that is powered by the wind.



Fig. 3.1

(a)	Explain how air particles exert a pressure on a sail and why, when no wind is blowing, the sail experiences the same pressure on both sides.						
	[3]						
(b)	A sail has an area $8.0\mathrm{m}^2$ . A wind of velocity $18.0\mathrm{m}\mathrm{s}^{-1}$ strikes the sail at $90^\circ$ to the surface of the sail. It is assumed that the velocity of the wind falls to zero when it strikes the sail.						
	Calculate the force on the sail and suggest why the assumption may not be accurate.						
	density of air = $1.2 \mathrm{kg}\mathrm{m}^{-3}$						

force on sail = ...... N [4]

(c) A constant force of 300 N strikes the sail of a land yacht at an angle of 50° to the direction of motion of the vehicle as shown in Fig. 3.2. The mass of the yacht and rider is 135 kg.

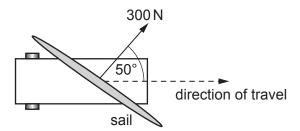


Fig. 3.2

Calculate the time for the land yacht to travel 50 m in the direction shown. The yacht starts from rest. Ignore resistive forces.

time = .....s [4]

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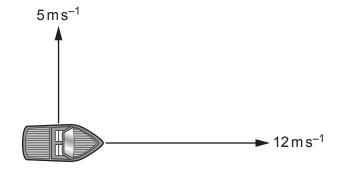
4 An image sent from Pluto to Earth is  $1024 \times 1024$  pixels. Each pixel is coded by 12 bits. The data is transferred at a rate of 200 bytes per second.

How long does it take to transmit the data?

- A 11 minutes
- **B** 87 minutes
- C 131 minutes
- **D** 1049 minutes

Your answer [1]

5 A boat travels eastwards with a velocity of 12 m s<sup>-1</sup>.
A current from the south pushes the boat northwards at a velocity of 5 m s<sup>-1</sup>.



What is the magnitude of the resultant velocity of the boat?

- **A**  $7 \, \text{m s}^{-1}$
- **B** 13 m s<sup>-1</sup>
- $C 17 \,\mathrm{m\,s^{-1}}$
- $D 169 \,\mathrm{m\,s^{-1}}$

Your answer [1]

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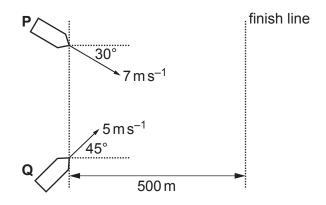
24 A ball is kicked from horizontal ground at a velocity of 15 m s<sup>-1</sup> at an angle of 20° to the horizontal.

How long will the ball remain in the air before hitting the ground? Ignore any effects of air resistance.

- **A** 0.5s
- **B** 1.0s
- **C** 1.4s
- **D** 2.9s

Your answer [1]

25 The diagram shows two boats P and Q sailing at constant velocity towards the finish line.



Which statement is correct?

- A Boat P wins by 1.4s.
- B Boat Q wins by 29s.
- **C** Boat **P** wins by 59 s.
- **D** Boat **Q** wins by 198s.

Your answer [1]