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KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

PHYSICAL SCIENCES P1

PROVINCIAL STANDARDISED ASSESSMENT

NOVEMBER 2026

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MARKS: 100

DURATION: 2 hours

This question paper consists of 11 pages and a data sheet.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of nine questions. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page in the ANSWER BOOK.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Leave ONE line between two sub-questions, for example between QUESTION 2.1 and QUESTION 2.2.
5. You may use a non-programmable calculator.
6. You may use appropriate mathematical instruments.
7. You are advised to use the attached DATA SHEET.
8. Show ALL formulae and substitutions in ALL calculations.
9. Round off your final numerical answers to a minimum of TWO decimal places.
10. Give brief motivations, discussions et cetera where required.
11. Write neatly and legibly.

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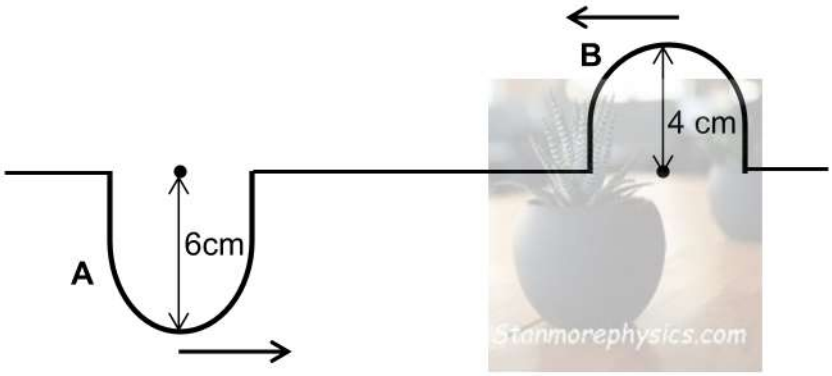
QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A to D) next to the question number(1.1 to 1.7) in your ANSWER BOOK, for example 1.8 D

1.1 The wavelength of a sound wave is increased.
Which ONE of the following will also INCREASE when the wave speed is kept constant?

A amplitude
B period
C frequency
D pitch (2)

1.2 Trough **A** and crest **B**, approach each other as shown below.



The resultant amplitude of the wave pulses when they meet at a point is a ….

A 10cm crest
B 2cm crest
C 2cm trough
D 10cm trough (2)

1.3 The energy of a photon of light, photon P is **E**.
What is the energy of a second photon, whose wavelength is TWICE the wavelength of photon P? downloaded from Stanmorephysics.com

A $\frac{1}{2}$ E
B E
C 2E
D 4E (2)

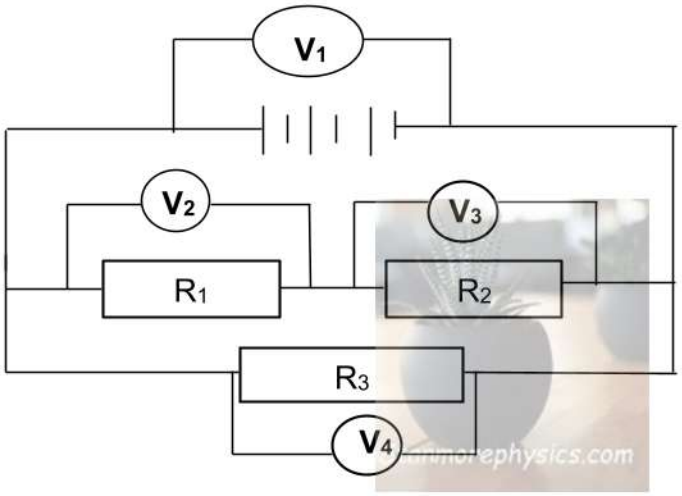
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1.4 A ruler acquires a negative charge after it has been rubbed with wool. Which one of the following statements explains this observation?

A Electrons are transferred from the ruler to the wool.
B Protons are transferred from the wool to the ruler.
C Protons are transferred from the ruler to the wool.
D Electrons are transferred from the wool to the ruler. (2)

1.5 Consider a circuit diagram below consisting of a battery and three resistors. below. The battery has negligible internal resistance.



What is the relationship between the readings on voltmeters **V_1,V_2 ,V_3** and **V_4**?

A $V_1 = V_2 = V_3 = V_4$

B $V_1 = V_2 + V_3 + V_4$

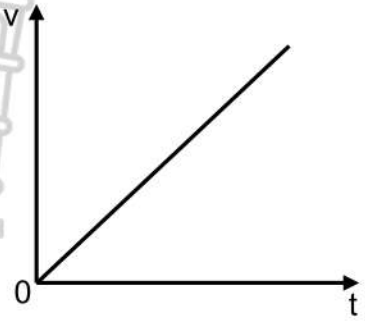
C $V_1 + V_4 = V_3 + V_2$

D $V_1 = V_2 + V_3 = V_4$ (2)

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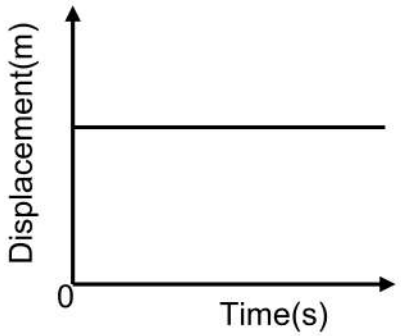
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1.6 A cyclist is travelling along a straight , level road. A velocity-time(v-t) graph of the motion of the cyclist is shown below.

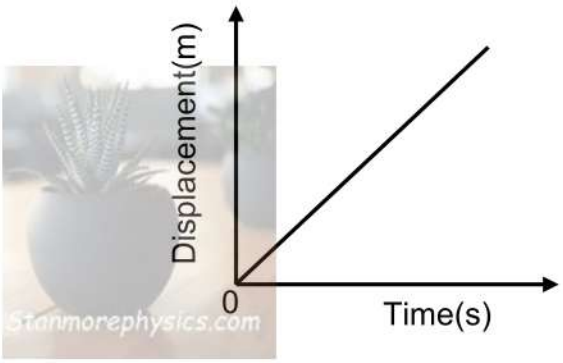


Which ONE of the following displacement-time graph correctly represents the motion of the cyclist? (2)

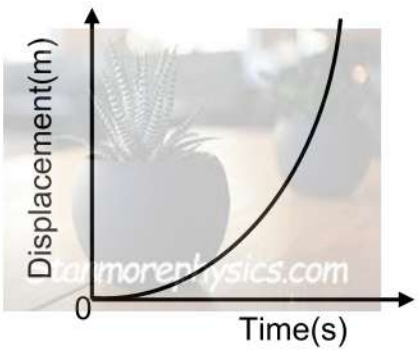
A



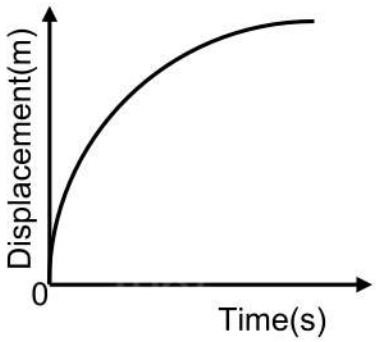
C



B



D



1.7 A ball of mass 200 g is thrown with an initial speed of 20 $m \cdot s^{-1}$.
What is the initial kinetic energy, in joules, of the ball?

A 40000
B 400
C 40
D 4

(2)

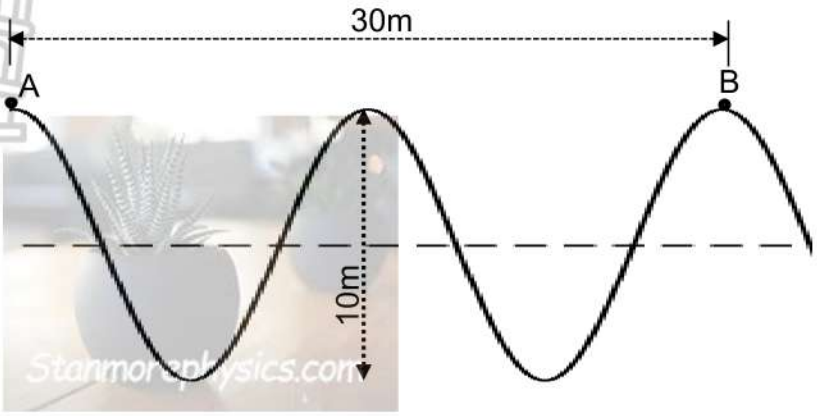
[14]

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QUESTION 2 (Start on a new page.)

The diagram below represents a transverse wave with a frequency of 20Hz moving from left to right. The distance between A and B is 30m.



2.1 Give a reason why this wave is a *transverse wave* (2)

2.2 For this wave, determine the:

2.2.1 amplitude (1)

2.2.2 wavelength (1)

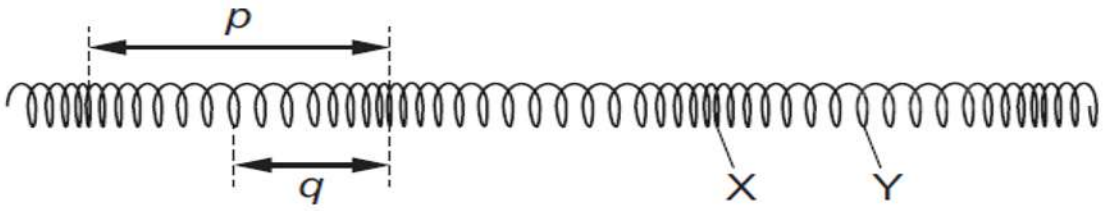
2.2.3 speed (3)

2.2.4 time it takes to move from A to B (3)

[10]

QUESTION 3 (Start on a new page.)

The diagram below shows a longitudinal wave generated in a spring at a speed of **0,5 m·s^{-1}**.Two lengths ***p*** and ***q*** are marked where ***p* = 2*q***, and **X** and **Y** are components of the wave. downloaded from Stanmorephysics.com



3.1 Write down one example of a longitudinal wave. (1)

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3.2 Write down the letter that represents a rarefaction (1)

3.3 If length of **q** is 2m, calculate the:

3.3.1 wavelength of the wave (1)

3.3.2 frequency of the wave (3)

[6]

QUESTION 4 (Start on a new page.)

4.1 Define a *photon* (2)

4.2 State the mathematical relationship between the wavelength and the frequency of electromagnetic wave. (1)

4.3 Will a photon of infra red light have MORE ENERGY or LESS ENERGY than a photon of ultraviolet light?. (2)
Give a reason for the answer.

4.4 A particle has $2,07 \times 10^{-11}$ J of energy and a wavelength of $9,61 \times 10^{-15}$m. (4)
By means of a calculation, **show** that the above particle is a photon in space.

[9]

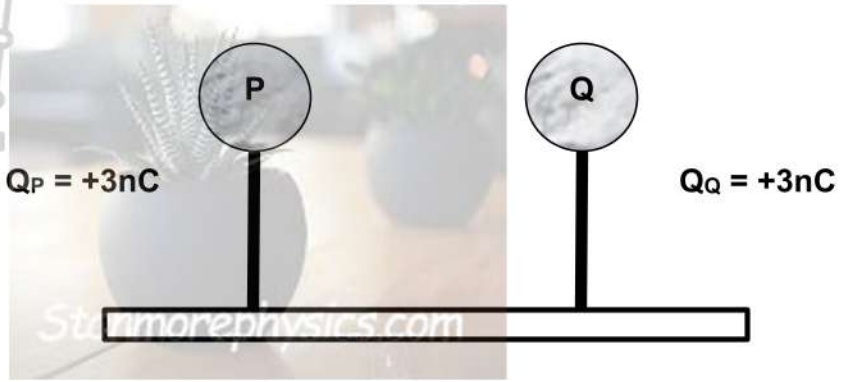
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QUESTION 5 (Start on a new page.)

The diagram below shows two small identical spheres, **P** and **Q**, on insulated stands. The spheres are allowed to touch and then separated. After separation, the charge on each sphere is +3nC.



5.1 State the *principle of conservation of charge* (2)

5.2 If the charge on sphere **P** was - 1nC BEFORE the sphere's touched, calculate the initial charge on sphere **Q**. (3)

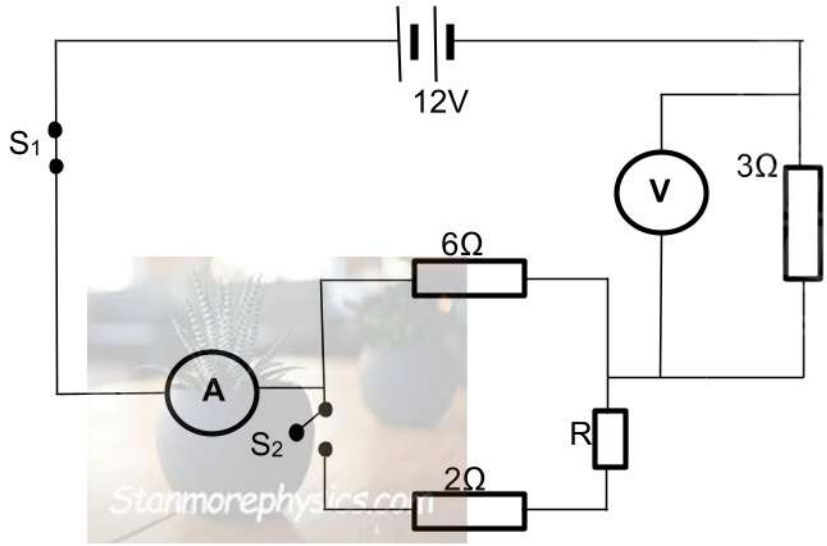
5.3 Were electrons transferred from **P to Q** or from **Q to P** during contact? (1)

5.4 Calculate the number of electrons transferred when the sphere's touched. (4)

[10]

QUESTION 6 (Start on a new page.)

An electric circuit is set up as shown below. The battery has an emf of 12V and has negligible resistance. downloaded from Stanmorephysics.com



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6.1 Define *emf* of a battery (2)

Switch S_1 is closed while switch S_2 is opened.

6.2 Calculate the reading on the ammeter. (3)

Both switch S_1 and switch S_2 are now closed. The ammeter reads 2,4A

6.3 Calculate the :

6.3.1 reading on the voltmeter . (3)

6.3.2 potential difference across the 6 Ω resistor (2)

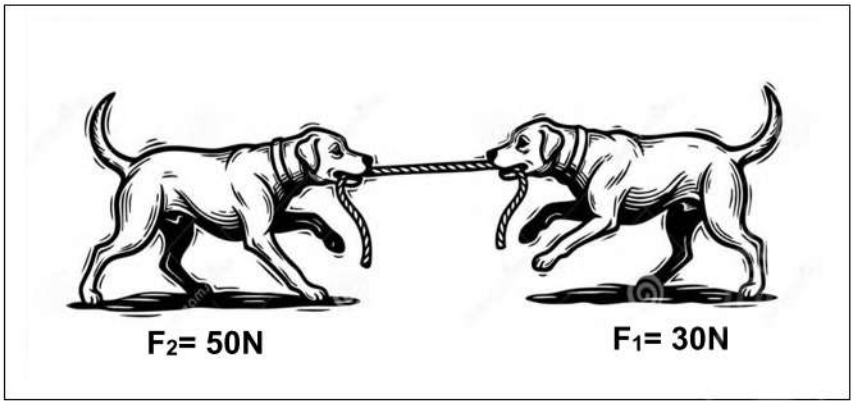
6.3.3 energy transferred to the 6 Ω resistor in 2 minutes (4)

6.3.4 resistance of resistor R (5)

[19]

QUESTION 7 (Start on a new page.)

The diagram below shows two dogs pulling at the opposite ends of the rope as shown in the diagram below. The dog on the **right** applies a force **F_1 of 30N** while the dog on the left applies a force **F_2 of 50N.**



7.1 Define *resultant force* (2)

7.2 Using the tail-to-head method and a scale of 10 mm represents 10 N, draw an accurate vector diagram to determine the resultant force acting on the rope. (4)

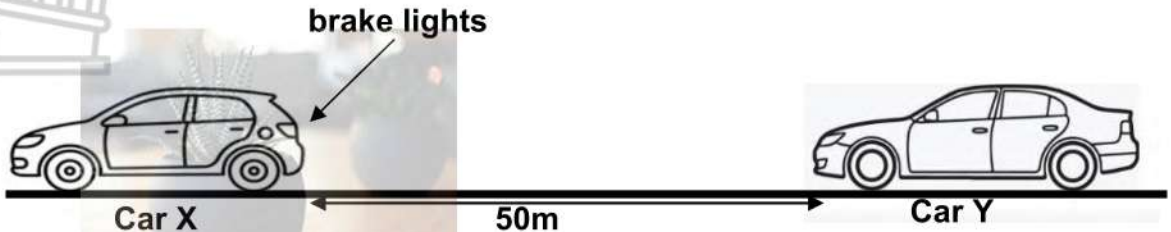
[6]

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QUESTION 8 (Start on a new page.)

Two cars, **X** and **Y** are moving at a constant velocity of 30 $m \cdot s^{-1}$. The cars are separated by a distance of **50m**.The driver of car **X** sees a donkey in the road ahead and applies the brakes hard instantly , coming to rest in 5 seconds . The driver of car **Y** has a reaction time of 0,8 seconds from the time he **sees the brake lights of car X .**



8.1 Calculate the:

8.1.1 magnitude of car **X's** average acceleration while braking. (3)

8.1.2 distance car **X** travels from the point where its brakes were applied to the point where it came to rest? (3)

8.2 The brakes of car **Y** can decrease its velocity by 7 $m \cdot s^{-1}$ every second. Calculate:

8.2.1 the maximum distance that car **Y** can travel without colliding with car **X** (2)

8.2.2 Will car **X** collide with car **Y**? (6)
Support your answer with relevant calculations.

8.3 What is the minimum following distance car **Y** should keep to avoid an accident? (2)

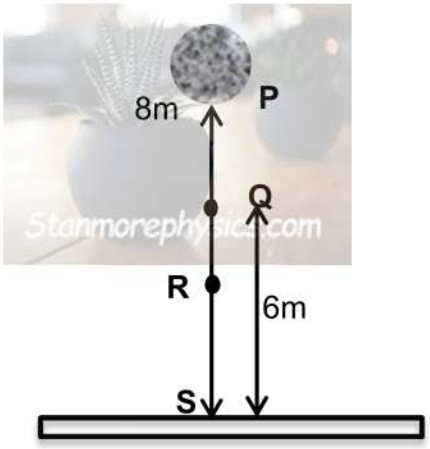
[16]

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QUESTION 9 (Start on a new page.)

A girl drops a 4kg steel ball from point **P**,8m above the ground. Point **Q** is 6m above the ground. At point **R**, the ball is travelling at a speed of 7,85 $m \cdot s^{-1}$.The ball strikes the ground at point **S**. See the diagram below.



9.1 State the *principle of conservation of mechanical energy* (2)

9.2 Determine the :

9.2.1 mechanical energy of the ball at point **P** (3)

9.2.2 speed of the ball at point **Q** (3)

9.2.3 height above the ground of point **R** (2)

[10]

TOTAL [100]

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DATA FOR PHYSICAL SCIENCES GRADE 10
PAPER 1 (PHYSICS)

TABLE 1: PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Acceleration due to gravity	g	9,8 $m.s^{-2}$
Speed of light in a vacuum	c	3,0 x 10^8 $m{\cdot}s^{-1}$
Planck's constant	h	6,63 x 10^{-34} J·s
Charge on electron	q_e	1,6 x 10^{-19} C
Electron mass	m_e	9,11 x 10^{-31} kg

TABLE 2: FORMULAE

.

WAVES, SOUND AND LIGHT

$v = f\lambda$ or $c = f\lambda$	$T = \frac{1}{f}$
E = hf	$E = \frac{hc}{\lambda}$
speed = $\frac{\text{distance}}{\text{time}}$	

ELECTROSTATICS

$Q = n \times q_e$	$Q = \frac{Q_1 + Q_2}{2}$

ELECTRIC CIRCUITS

$Q = I \times \Delta t$	$\frac{1}{Rp} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots.$
$R_s = R_1 + R_2 + \cdots$	$V = \frac{W}{Q}$

MOTION

$v_f = v_i + a\Delta t$	$\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$
$v_f^2 = v_i^2 + 2a\Delta x$	$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t$

WORK, ENERGY AND POWER

U = mgh or E_p = mgh	K = $\frac{1}{2}mv^2$ or $E_k = \frac{1}{2}mv^2$

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PHYSICAL SCIENCES P1

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NOVEMBER 2026

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QUESTION 1:

1.1 B ✓✓ (2)
1.2 C ✓✓ (2)
1.3 A ✓✓ (2)
1.4 D ✓✓ (2)
1.5 D ✓✓ (2)
1.6 B ✓✓ (2)
1.7 C ✓✓ (2)
[14]

QUESTION 2

2.1 Particles of the medium vibrate at right angles to the direction of motion of the wave✓✓ **2 or 0 or**
The wave consists of crests and troughs✓✓ (2)

2.2.1 Amplitude $= \frac{10}{2}$
$= 5m$✓

FULL MARKS FOR CORRECT ANSWER (1)

2.2.2 $\lambda = \frac{30}{2}$
$= 15m$✓

FULL MARKS FOR ANSWER ONLY (1)

2.2.3 $V = f \times \lambda$✓
$= 20 \times 15$✓
$= 300 m.s^{-1}$ ✓

POSITIVE MARKING FROM 2.2.2 (3)

2.2.4 **OPTION 1**
$T = \frac{1}{f}$
$= \frac{1}{20}$ ✓
$= 0,05s$
∴time for 2 waves
$= 2 \times 0,05$✓
$= 0,1$ s✓

POSITIVE MARKING FROM 2.2.3

OPTION 2

speed $= \frac{\text{distance}}{\text{time}}$✓
$300 = \frac{30}{time}$ ✓
$= 0,1$ s ✓

(3)

[10]

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QUESTION 3

3.1 Sound ✓ (1)

3.2 Y✓ (1)

3.3.1 λ =2 × 2
= 4m✓ (1)

FULL MARKS FOR ANSWER ONLY

3.3.2 V = f × λ✓
0,5 = f ×4✓
f = 0,125m ✓(0,13m) (3)

POSITIVE MARKING FROM 3.3.1

[6]

QUESTION 4

4.1 Packet of energy found in light or packet of light energy✓✓ **2 or 0** (2)

4.2 Inversely proportional✓ or $f = \frac{1}{\lambda}$ ✓ (1)

4.3 Less energy✓
It has a lower frequency/longer wavelength✓ (2)

4.4 **OPTION 1**

$$E = \frac{hc}{\lambda} \checkmark$$

$$2{,}07\times10^{-11} \checkmark = \frac{6{,}63\times10^{-34}\times v \checkmark}{9{,}61\times10^{-15}}$$

$v = 3\times10^{8}$ m.s^{-1}✓

OPTION 2

c = f x λ
3 x 10^8 = f x 9,61 x10^{-15}✓
f = 3,12 x10^{22}Hz
E = h x f ✓
= 6,63 x10^{-34} x 3,12 x10^{22}Hz ✓
= 2,07 x10^{-11} J✓

OPTION 3

c = f x λ
3 x 10^8 = f x 9,61 x10^{-15}✓
f = 3,12 x10^{22}Hz
E = h x f ✓
2,07 x10^{-11} = h x 3,12 x10^{22}Hz ✓
= 6,63 x10^{-34} J.s ✓ (4)

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[9]

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QUESTION 5

5.1 Net/total charge remains constant in an isolated system during any physical process.✓✓ **2 or 0** (2)

5.2 $Q = \frac{Q_1 + Q_2}{2}$ ✓

$+3 \times 10^{-9} = \frac{-1 \times 10^{-9} + Q_Q}{2}$ ✓

$Q_Q = +7 \times 10^{-9}$ C ✓ (3)

5.3 From P to Q ✓ (1)

5.4 $\Delta Q = +3 \times 10^{-9} - (-1 \times 10^{-9})$ ✓ **or** $\Delta Q = +3 \times 10^{-9} - 7 \times 10^{-9}$ ✓

$= +4 \times 10^{-9}$ C $= -4 \times 10^{-9}$ C

$Q = n \times q_e$ ✓ $Q = n \times q_e$ ✓

$4 \times 10^{-9} = n \times 1{,}6 \times 10^{-19}$ ✓ $-4 \times 10^{-9} = n \times -1{,}6 \times 10^{-19}$ ✓

$n = 2{,}5 \times 10^{10}$ (electrons) ✓ $n = 2{,}5 \times 10^{10}$ (electrons) ✓ (4)

[10]

QUESTION 6

6.1 The energy supplied by the battery per unit charge ✓✓ **2 or 0** (2)

6.2 $R_s = 6 + 3$

$= 9\ \Omega$

$R = \frac{V}{I}$ ✓

$9 = \frac{12}{I}$ ✓

$I = 1{,}33$ A✓

Note that the equation: V = I x R, was omitted from the data sheet. Accept an incorrect manipulation of the equation from a learner and award marks in terms of substitutions into the formula given. This will apply to subsequent questions dealing with this formula. Positive marking will apply as well.
Eg. $R = \frac{I}{V}$ ✓, $9 = \frac{I}{12}$ ✓ and I= 108A✓
*deviation applies (3)

6.3.1 $R = \frac{V}{I}$ ✓

$3 = \frac{V}{2{,}4}$ ✓

$V = 7{,}2$ v ✓

*deviation applies (3)

6.3.2 $V_{6\Omega} = 12 - 7{,}2$ ✓

$= 4{,}8$v ✓

POSITIVE MARKING FROM 6.3.1 (2)

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6.3.3

*deviation applies

$V = \frac{W}{Q} = \frac{W}{I\Delta t}$ ✓

$4.8 = \frac{W}{(0,8)(120)}$ ✓

W = 460,8 J ✓

or

$R = \frac{V}{I}$

$6 = \frac{4,8}{I}$ ✓

I = 0,8A

$W = \frac{V^2 \Delta t}{R}$ ✓

$= \frac{4,8^2\ (120)}{6}$ ✓

= 460,8J✓

or

$W = I^2R\Delta t$✓

$= (0,8)^2(6)(120)$ ✓

= 460,8J✓

(4)

6.3.4

POSITIVE MARKING FROM 6.3.2 AND 6.3.3

OPTION 1

$I_R = 2,4 - 0,8$ ✓

$= 1,6$ A

$V_{2\Omega} = IR$

$= (1,6)(2)$

$= 3,2$ V---

$V_R = 4,8 - 3,2$✓

$= 1,6$ V

$R = \frac{V}{I}$ ✓

$= \frac{1,6}{1,6}$ ✓

$= 1\ \Omega$ ✓

OPTION 2

$I_{6\Omega} = \frac{V}{R}$

$= \frac{4,8}{6}$ ✓

$= 0,8$ A

$I_{(R+2\Omega)} = 2,4 - 0,8$ ✓

$= 1,6$A

$R_{(R+2\Omega)} = \frac{V}{I}$

$= \frac{4,8}{1,6}$ ✓

$= 3\ \Omega$ ✓

$R = 3 - 2$

$= 1\ \Omega$ ✓

OPTION 3

$V_P = V_{6\Omega} = 4,8$V✓

$R_P = \frac{V}{I}$

$= \frac{4,8}{2,4}$ ✓

$= 2\ \Omega$

$R_P = \frac{R1 \times R2}{R1+R2}$ **or** $\frac{1}{Rp} = \frac{1}{R1} + \frac{1}{R2}$✓

$2 = \frac{6 \times (2+R)}{6+(2+R)}$ ✓

R = 1 Ω ✓

(5)

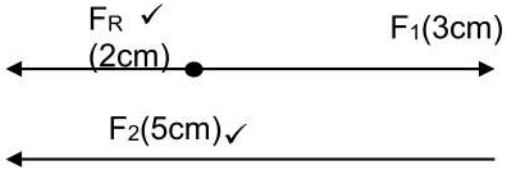
[19]

QUESTION 7

7.1 A single force that has the same effect as two or more forces acting together (2)

✓✓ **2 or 0** downloaded from Stanmorephysics.com

7.2



F_R = 20N west/left ✓

CRITERIA	
✓	**F_1** drawn with correct scale and direction
✓	**F_2** drawn tail-to-head with correct scale and direction
✓	**F_R** drawn tail-to-head with correct scale and direction
✓	Correct final answer in magnitude and direction

(4)

[6]

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QUESTION 8

8.1.1 $v_f = v_i + a\Delta t$ ✓

$0 = 30 + a(5)$ ✓

$a = 6\ m.s^{-2}$ ✓ (3)

8.1.2 $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$ ✓

$= 30(5) + \frac{1}{2}(-6)(5)^2$ ✓

$= 75\ m$ ✓ (3)

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8.2.1 **POSITIVE MARKING FROM 8.1.2** (2)

Total stopping distance car y has to avoid hitting x = 75+50 ✓

= 125 m ✓

8.2.2 **Dist. car Y travels during the 0,8 s reaction time**

$\Delta x = v_i\Delta t$ → constant speed **or** $\Delta x = v_i\Delta t + \frac{1}{2}a\Delta t^2$

$= 30(0,8)$ ✓ $= 30(0,8) + 0$

$= 24m$ $= 24m$

Dist. car Y travels while coming to rest

$v_f^2 = v_i^2 + 2a\Delta x$ ✓

$0^2 = 30^2 + 2(-7)\ \Delta x$ ✓

$\Delta x = 64,29m$

∴**Total stopping distance** = 64,29 +24 ✓

= 88,29m ✓

POSITIVE MARKING FROM 8.2.1 (for conclusion) (6)

(88,29m is less than 125m **or** 88,29m < 125m,) car Y will **NOT** collide car X. ✓

8.3 Minimum distance = 88,29 - 75 ✓

= 13,29 m ✓ (2)

[16]

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QUESTION 9

9.1 Total mechanical energy remains constant in an isolated system ✓✓ **2 or 0** (2)

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9.2.1 $E_{M_p} = Ep + Ek$
$= mgh + \frac{1}{2}mv^2$ ✓
$= (4)(9,8)(8) + 0$✓
$= 313,6$ J ✓ (3)

9.2.2 **POSITIVE MARKING FROM 9.2.1**

$E_{M_p} = E_{M_Q}$
$= mgh + \frac{1}{2}mv^2$
$313,5$✓$= \underline{(4)(9,8)(6) + \frac{1}{2}(4)V^2}$ ✓
$V = 6,26\ m.s^{-1}$ ✓ (3)

9.2.3 **POSITIVE MARKING FROM 9.2.1**

$E_{M_p} = E_{M_R}$
$= mgh + \frac{1}{2}mv^2$
$\underline{313,5 = (4)(9,8)h + \frac{1}{2}(4)(7,85)^2}$ ✓
$h = 4,85$m ✓ (2)

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[10]

TOTAL: 100

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