1.2   C ✓✓

1.4   A ✓✓

1.8   B ✓✓

QUESTION 2/*VRAAG 2*

2.1   The difference in position (in space). ✓✓/*Die verskil in posisie in ruimte.*

      OR/*OF*

      The change in position (of an object.)✓✓/*Die verandering in posisie van 'n voorwerp.*   (2)

2.2   12 m ✓ west/*wes* ✓ or/*of* -12 m ✓✓

      IF/*INDIEN*
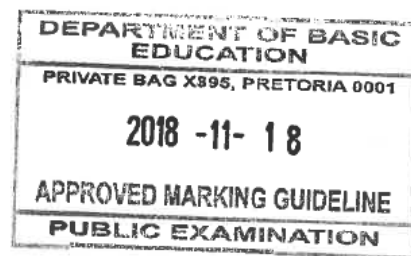   – 12 m West/Wes   (Award 1 mark only/*Ken 1 punt toe*)

      Accept/*Aanvaar*
      12 m ✓ left/*links* ✓   (2)

2.3

$$v = \frac{\Delta x}{\Delta t}$$

$$= \frac{5 \;✓}{30 \;✓}$$

$$= 0{,}17 \text{ m·s}^{-1} ✓ \text{ west/}wes ✓$$

      Accept/*Aanvaar*
      0,17 m·s⁻¹ ✓ left/*links* ✓   (4)

2.4   **POSITIVE MARKING FROM 2.2 and 2.3/*POSITIEWE NASIEN VANAF 2.2.en2.3***

$$\text{Speed} = \frac{\text{distance}}{\text{time}} \;/\; \text{Spoed} = \frac{\text{afstand}}{\text{tyd}}$$

$$(0{,}17)(2) \;✓ = 0{,}34 \text{ m·s}^{-1}$$

$$0{,}34 \;✓ = \frac{12 \;✓}{\Delta t}$$

$$\Delta t = 35{,}29 \text{ s} ✓$$

                                                (4)
                                              [12]

QUESTION 3/VRAAG 3

3.1   **Motion with uniform velocity:** Motion at constant velocity. ✓✓/ Motion with zero or no acceleration.
Beweging met uniforme snelheid: Beweging teen konstante snelheid./ Beweging met nul of geen vernselling.

        Uniform accelerated motion: Motion with constant acceleration.✓✓/Velocity changes with the same amount during each time interval. ✓✓/Motion during which the velocity changes with a constant amount per unit time. ✓✓/ *Uniforme versnelde beweging: Beweging met konstante versnelling/Snelheid verander met dieselfde hoeveelheid gedurende elke tydinterval/Beweging waartydens die snelheid met 'n konstante hoeveelheid per eenheid tyd verander.*   (4)
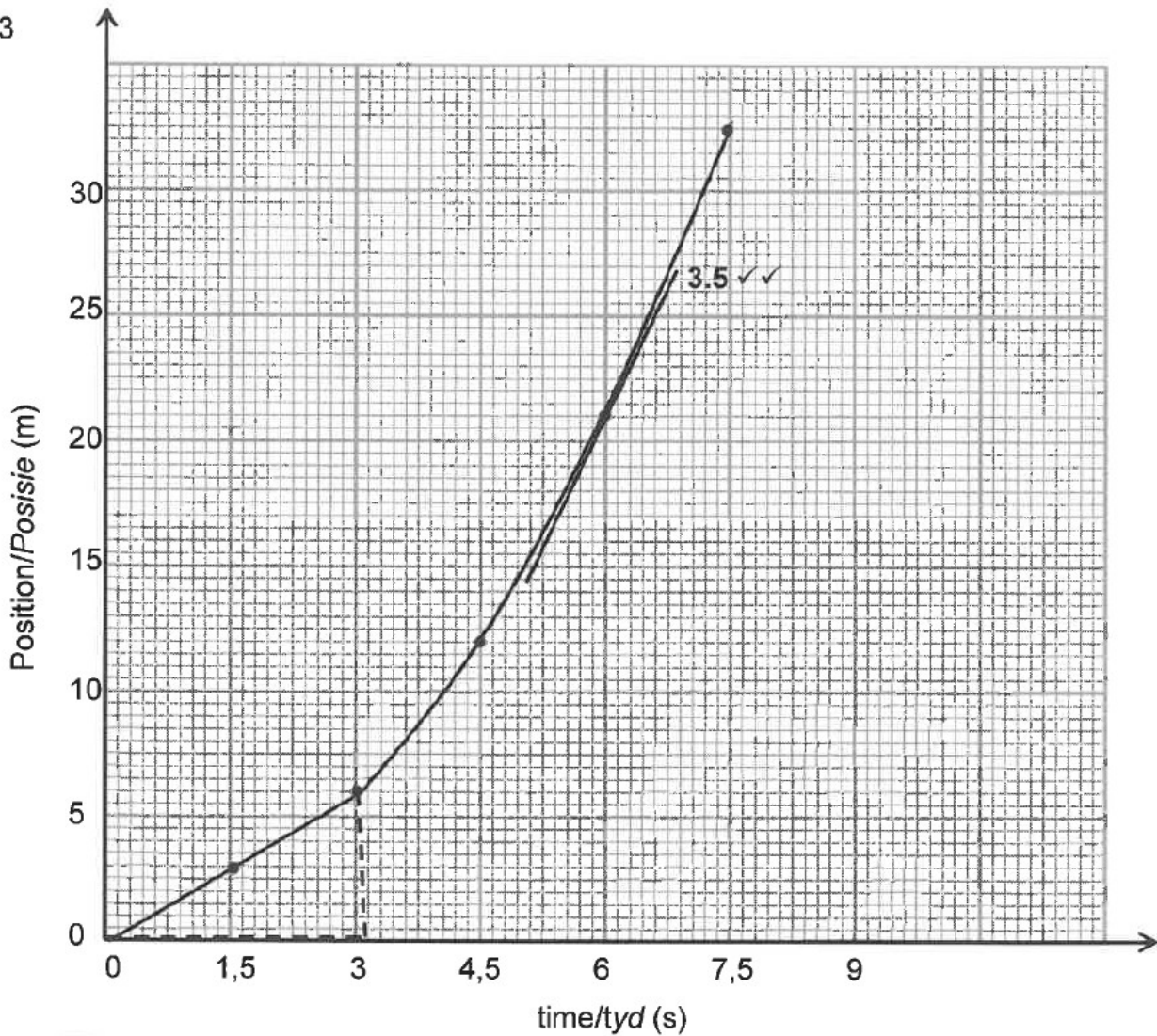
3.2.1   Motion with uniform velocity✓/*Beweging met uniforme snelheid*   (1)

3.2.2   Uniform accelerated motion ✓/*Uniforme versnelde beweging*   (1)

3.3

(5)

3.4 Instantaneous velocity: rate of change in position. ✓✓/*Oombliklike snelheid: tempo van verandering in posisie.*

OR/OF
Displacement divided by a very small time interval. ✓✓/*Verplasing gedeel deur 'n baie klein tydinterval.*

OR/OF
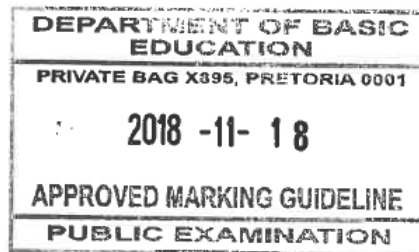Velocity at a particular time. ✓✓/*Snelheid op 'n spesifieke tyd.* (2)

3.5 Refer to the graph./*Verwys na die grafiek.*
(Tangent to the curve/ *Raaklyn aan kurwe*) (2)

3.6
$$v = \frac{\Delta x}{\Delta t}$$
$$= \frac{6-0}{3-0} \checkmark \checkmark$$
$$= 2 \text{ m·s}^{-1} \checkmark \quad \text{right/}regs \checkmark$$

(4)
[19]

QUESTION 4/VRAAG 4

4.1 The rate of change of velocity. ✓✓/*Die tempo van verandering van snelheid.* (2)

4.2.1 $v_f = v_i + a\Delta t$ ✓
$0\checkmark = \underline{15 + (-4,5)\Delta t}$ ✓
$\Delta t = 3,33$ s ✓

OR/OF
$v_f = v_i + a\Delta t$ ✓
$0\checkmark = \underline{-15 + (4,5)\Delta t}$ ✓
$\Delta t = 3,33$ s ✓

(4)

4.2.2

OPTION 1/OPSIE 1
$v_f^2 = v_i^2 + 2a\Delta x$ ✓
$0^2 \checkmark = \underline{15^2 + 2(-4,5)\Delta x}$ ✓
$\Delta x = 25$ m ✓

OPTION 2/OPSIE 2
POSITIVE MARKING FROM 4.2.1/POSITIEWE NASIEN VANAF 4.2.1
$$\Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t \checkmark$$
$$= \left(\frac{0+15}{2}\right)(3,33)\checkmark$$
$$= 24,98 \text{ m} \checkmark$$

OPTION 3/OPSIE 3
POSITIVE MARKING FROM 4.2.1/POSITIEWE NASIEN VANAF 4.2.1
$\Delta x = v_i\Delta t + \frac{1}{2} a\Delta t^2$ ✓
$= (15)(3,33) \checkmark + \frac{1}{2}(-4,5)(3.33)^2\checkmark$
$\Delta x = 25$ m ✓

(4)

4.3 **OPTION 1/OPSIE 1**

$v_f^2 = v_i^2 + 2a\Delta x$ ✓

0^2 ✓ $= \underline{30^2 + 2(-4,5)\Delta x}$ ✓

$\Delta x = 100$ m ✓

Car B ✓has a larger stopping distance (100 m > 25 m)✓ /Kar B het 'n groter stopafstand (100 m > 25 m).

OPTION 2/OPSIE 2

$v_f = v_i + a\Delta t$ ✓

0✓ $= 30 + (-4,5)\Delta t$✓

$\Delta t = 6,67$ s✓

Car B✓ it takes longer to stop hence larger stopping distance ✓/ Kar B dit neem langer om tot stilstand te kom dus 'n groter stopafstand

IF/INDIEN

Car B ✓ it has a <u>higher velocity</u> than car A and therefore have a larger stopping distance at the <u>same acceleration</u> ✓ Max: (2/6)
Kar B dit het 'n hoër snelheid as kar A en het dus 'n groter stopafstand met dieselfde versnelling Maks: (2/6)   (6)

4.4 The greater/larger the speed, the larger the stopping distance ✓ if acceleration is constant. ✓/Hoe groter die spoed, hoe groter die stopafstand indien versnelling konstant is.   (2)

                                                                                                        [18]

1.1   B✓✓   (2)

1.2   C✓✓   (2)
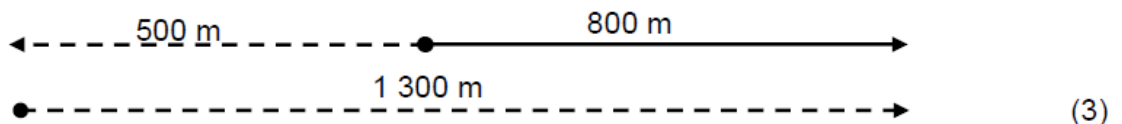
1.3   A✓✓   (2)

QUESTION/*VRAAG 2*

2.1   The total distance travelled per total time✓✓
        Die totale afstand beweeg per totale tyd. ✓✓

        OR/*OF*

        The distance travelled divided by the total time✓✓
        Die afstand beweeg gedeel deur die totale tyd. ✓✓   (2)

2.2   Average speed/*Gemiddelde spoed* = $\dfrac{\text{distance travelled/}afstand}{\text{time taken/}tyd}$ ✓

        $= \dfrac{(500 + 800)✓}{(30 \times 60)✓}$

        $= 0{,}72 \text{ m·s}^{-1}$ ✓   (4)

2.3

MARK ALLOCATION:	*PUNTETOEKENNING:*
✓1 x correct scale length for 800 m	✓*1 x korrekte skaal vir 800 m*
✓1 x arrow and	✓*1 x pylpunt*
✓1 x 800 m (3)	✓*1 x 800 m*

                                                                                              (3)

2.4   **POSITIVE MARKING FROM QUESTION 2.2**
        POSITIEWE NASIEN VANAF VRAAG 2.2

        Average speed/*Gemiddelde spoed* = $\frac{\text{distance travelled/}afstand}{\text{time taken/}tyd}$ ✓

        $0{,}72✓ = \dfrac{(500 + 500 + 1\,300)}{\text{time taken/}tyd}$ ✓

        $t = 3\,194{,}44 \text{ s}$ ✓   (4)
                                                                                            [13]
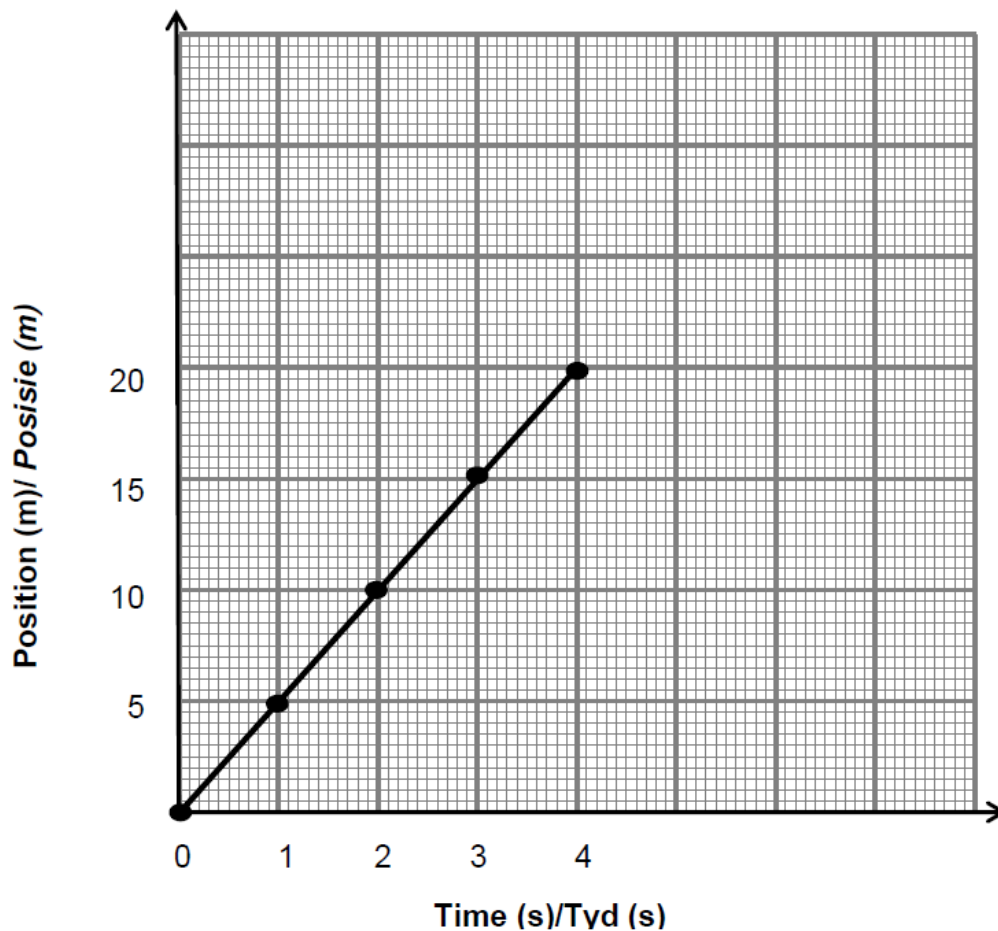
QUESTION/*VRAAG 3*

3.1　　(Average) velocity ✓/*(Gemiddelde) snelheid* ✓　　　　　　　　　　　(1)

3.2.1　Time ✓/*Tyd* ✓　　　　　　　　　　　　　　　　　　　　　　(1)

3.2.2　Position ✓/*Posisie* ✓　　(Accept: Change in position/*Aanvaar verandering in posisie)*)　　　　　　　　　　　　　　　　　　　　　　　　　　(1)

3.3

MARK ALLOCATION:	**PUNTETOEKENNING:**
✓　1 x correct y-axis label and unit	✓　*1 x y-as benoem en eenheid*
✓　1 x correct x-axis label and unit	✓　*1 x x-as benoem en eenheid*
✓✓ 2 x points plotted and joined	✓✓ *2 x punte geplot en verbind*
✓　1 x shape of graph	✓　*1 x vorm van grafiek*

(5)

3.4　　Gradient/*Helling* = $\dfrac{\Delta y}{\Delta x}$ ✓

$$= \dfrac{20 - 5 \checkmark}{4 - 1 \checkmark}$$

Accept other sets of
values/*Aanvaar enige stel
korrekte waardes*

$= 5(\,m\cdot s^{-1})$ ✓　　　　　　　　　　　　　　　　　　　(4)

3.5

✓ Correct shape/*korrekte vorm*

✓ Axes/*Asse*

(2)

3.6 The car has <u>zero (acceleration)/ 0 m·s⁻²</u> ✓✓as its velocity is constant.
Die motor het <u>geen versnelling /0 m·s⁻²</u> ✓✓✓nie as gevolg van 'n konstante snelheid.

(2)
[16]

QUESTION/*VRAAG 4*

4.1 Rate of change of velocity ✓✓/*Tempo van <u>verandering in snelheid</u>* ✓✓ (2)

4.2.1 $\Delta x = v_i \Delta t + \frac{1}{2}a\Delta t^2$✓

$\Delta x = 0(2)$✓$+ \frac{1}{2}(15)2^2$✓

$\Delta x = 30$ m✓

(4)

4.2.2 **POSITIVE MARKING FROM QUESTION 4.2.1**
POSITIEWE NASIEN VANAF VRAAG 4.2.1

OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$v_f^2 = v_i^2 + 2a\Delta x$✓	$v_f = v_i + a\Delta t$
$v_f^2 = 0^2$✓$+2(15)(30)$✓	$= 0$✓$+ 15 \times 2$✓
$v_f = 30$ m·s⁻¹ to the right✓/*regs*	$v_f = 30$ m·s⁻¹ to the right✓/*regs*
OPTION 3/*OPSIE 3*	
$\Delta x = \left(\frac{v_i + v_f}{2}\right)\Delta t$✓ $30 = \left(\frac{0✓ + v_f}{2}\right)2$✓ $v_f = 30$ m·s⁻¹ to the right✓/*regs*	

Accept: To the right/East/In the direction of motion
***Aanvaar:** Regs/Oos/In die bewegingsrigting*

(4)

4.3 When following a car, a motorist should keep a safe distance such that it takes <u>more than 2s</u>✓ to reach the <u>same position</u> ✓as the car in front.
Motoriste moet 'n veilige afstand tussen ander voertuie handhaaf, sodat dit meer as <u>2 sekondes</u> ✓sal neem om <u>dieselfde posisie</u>✓ as die voertuig voor jou te bereik.

(2)

OR/OF

The car will need 2 s to stop in an emergency and not hit the car in front. ✓✓
Die motor het 2 sekondes nodig om in 'n noodsituasie tot stilstand te kom, sonder om die voertuig voor jou te stamp.✓✓

4.4   Convert 90 km·h⁻¹ into m·s⁻¹/*Skakel 90 km·h⁻¹ om na m·s⁻¹*

$$\frac{90 \text{ km}}{1 \text{ h}} = \frac{90 \times 10^3}{3600} = 25 \text{ m·s}^{-1} ✓✓$$

OPTION 1/*OPSIE 1*:	OPTION 2/*OPSIE 2*:
$\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$ ✓	$\Delta x = \left(\frac{v_i + v_f}{2}\right) \Delta t$ ✓
$\Delta x = (25)(2)✓ + \frac{1}{2}(0)2^2$ ✓	$\Delta x = \left(\frac{25 + 25}{2}\right)✓(2)✓$
$\Delta x = 50$ m ✓	$\Delta x = 50$ m ✓

(6)

4.5   **POSITIVE MARKING FROM QUESTION 4.4**
       POSITIEWE NASIEN VANAF VRAAG 4.4

$$\frac{108 \text{ km}}{1 \text{ h}} = \frac{108 \times 10^3}{3600} = 30 \text{ m·s}^{-1} ✓$$

Difference in speed/*Verskil in spoed*: 30 – 25
                                $= 5$ m·s⁻¹ ✓
Car has to travel 30 m (80 – 50) at 5 m·s⁻¹to be at a 2 second distance behind the truck. Therefore: distance = (v) (t) ✓
                       30✓ = (5) (t)
                         t = 6 s ✓
Motor moet 30 m (80 – 50) teen 5 m·s⁻¹ry om 2 sekonde-afstand agter trok te wees. Daarom: afstand = (v) (t) ✓
                       30 ✓= (5) (t)
                         t = 6 s ✓

(5)
[21]

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1.1   B ✓✓   (2)

1.2   C ✓✓   (2)

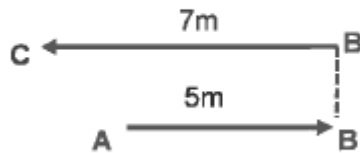1.3   D ✓✓   (2)

1.7   B ✓✓   (2)

QUESTION 2/VRAAG 2

2.1

Mark allocation/*Puntetoekenning*:

✓ 1 x line AB: length, arrow, label
      1 x lyn AB: lengte, rigting, benoem
✓ 1 x line BC: length, arrow, label
   1 x lyn BC: lengte, rigting, benoem

                                                                           (2)

2.2   2 m ✓ west/to the left✓
       2 m ✓ *wes/na links*✓   (2)

   OR
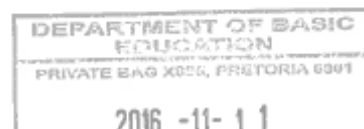
   If the learner has done 2.2 on the vector diagram above, allocate 1 mark for the
   resultant from A to C✓ and 1 mark for the label of the magnitude of 2m. ✓

   As leerder 2.2 op die bostaande vektordiagram aangedui het, ken 1 punt vir die
   resultant van A tot C toe, en 1 punt vir die benoeming van 2m

2.3   Total distance/*Totale afstand*
       = 5 + 7✓
       = 12 m✓   (2)

2.4   For the total distance, the whole path length travelled is considered. ✓
       For change in position, only the original position and final position✓of the man
       are considered.   (2)
       Vir die totale afstand word die totale padlengte afgelê in berekening gebring,
       maar slegs die begin- en eindposisie word in berekening gebring vir
       verandering in posisie.

2.5   Velocity is the rate of change of displacement. ✓✓
       Snelheid is die tempo waarteen verplasing (verandering in posisie) verander.   (2)

       ┌──┐
       │ ACCEPT: │
       │ Change in displacement over change in time   │
       │ AANVAAR: │
       │ Verandering in verplasing gedeel deur verandering in tyd │
       └──┘

2.6   **POSITIVE MARKING FROM 2.2**
       POSITIEWE NASIEN VANAF 2.2

       $v = \dfrac{\Delta x}{\Delta t}$ ✓

       $= \dfrac{2✓}{20✓}$

       = 0,1 m·s⁻¹ west/to the left✓
                    wes/na links   (4)
                                                                          [14]

QUESTION 3/VRAAG 3

3.1 Acceleration is the rate of change of velocity. ✓✓
Versnelling is die tempo van snelheidsverandering.

OR/OF

Acceleration is the change in velocity per unit time✓✓.
Versnelling is die verandering in snelheid per tydseenheid. (2)

3.2 No ✓
Nee (1)

3.3 **NEGATIVE MARKING FROM 3.2**
NEGATIEWE MERK VANAF 3.2

Velocity to the right, acceleration to the left ✓
Snelheid na regs, versnelling na links.

OR/OF

Taxi slowing down so <u>acceleration is in opposite direction</u>✓ to movement.
Die taxi beweeg stadiger, dus is <u>versnelling in die teenoorgestelde rigting</u> van beweging. (1)

3.4

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
$v = \dfrac{D}{\Delta t}$✓ or $\quad D = v \times \Delta t$ ✓ $\quad$ 25✓ $= \dfrac{D}{1}$✓ $\quad\quad = 25 \times 1$✓ $\quad$ $D = 25$ m ✓ $\quad\quad = 25$ m ✓	$\Delta x = \dfrac{(v_f + v_i)}{2} \Delta t$ ✓ $\quad = \dfrac{25 + 25}{2}$ ✓$\times 1$ ✓ $\quad = 25$ m ✓

OPTION 3/OPSIE 3	
$\Delta x = v_i t + \frac{1}{2} a \Delta t^2$ ✓ $\quad = 25 \times 1$✓ $+ \frac{1}{2} \times 0 \times 1^2$ ✓ $\quad = 25$ m ✓	

(4)

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OPTION 1/*OPSIE 1*	OPTION 2/*OPSIE 2*
$\Delta x = \left(\dfrac{v_f + v_i}{2}\right)\Delta t$ ✓ $= \dfrac{(0+25)}{2} \times 2$ ✓ $= 25$ m ∴ total distance/*totale afstand* $= 25 + 25$ ✓ $= 50$ m ✓ ∴taxi will not stop at the traffic light as distance > 40 m .: *die taxi sal nie* ✓ *by verkeerslig stop nie, want die afstand is* > 40 m **OR / *OF*** $\Delta x = \left(\dfrac{v_f + v_i}{2}\right)\Delta t$ ✓ $= \dfrac{(0+25)}{2} \times 2$ ✓ $= 25$ m ✓ ∴ distance available for braking time is $40 - 25 = 15$ m, therefore the taxi is short of 10 m to stop. ✓ ∴ the taxi will not stop in time. ✓ .: *die beskikbare afstand vir briektyd is* $40 - 25 = 15m$, *dus sal die taxi 10 m te min hê om te stop.* .: *dus sal die taxi nie betyds stop nie*	$v_f = v_i + a\Delta t$ ✓ $a = \dfrac{v_f - v_i}{\Delta t}$ $a = \dfrac{(0 - 25)}{2}$ ✓ $= -12{,}5$ m·s^{-2} *(Only one mark for either equation / Slegs een punt vir die enige een van die vergelykings.)* $v_f^2 = v_i^2 + 2a\Delta x$ $0 = 25^2 + 2 \times -12{,}5 \times \Delta x$ ✓ ∴ $\Delta x = 25m$ ∴ total distance/*totale afstand* $= 25 + 25$ $= 50$ m ✓ ∴taxi will not stop at the traffic light as distance > 40 m ✓ .: *die taxi sal nie by verkeerslig stop nie, want die afstand is* > 40 m

OPTION 3/*OPSIE 3*

$a = \dfrac{v_f - v_i}{\Delta t}$ ✓

$= \dfrac{(0 - 25)}{2}$ ✓

$= -12{,}5$ m·s^{-2}

$\Delta x = v_i t + \tfrac{1}{2}a\Delta t^2$

$= 25 \times 2 + \tfrac{1}{2} \times -12{,}5 \times 2^2$ ✓

$= 25$ m

∴ total distance/*totale afstand*

$= 25 + 25$

$= 50$ m ✓

∴taxi will not stop at the traffic light, as distance > 40 m ✓

.: *die taxi sal nie betyds stop nie, want die afstand is* > 40 m

Only one mark for either equation

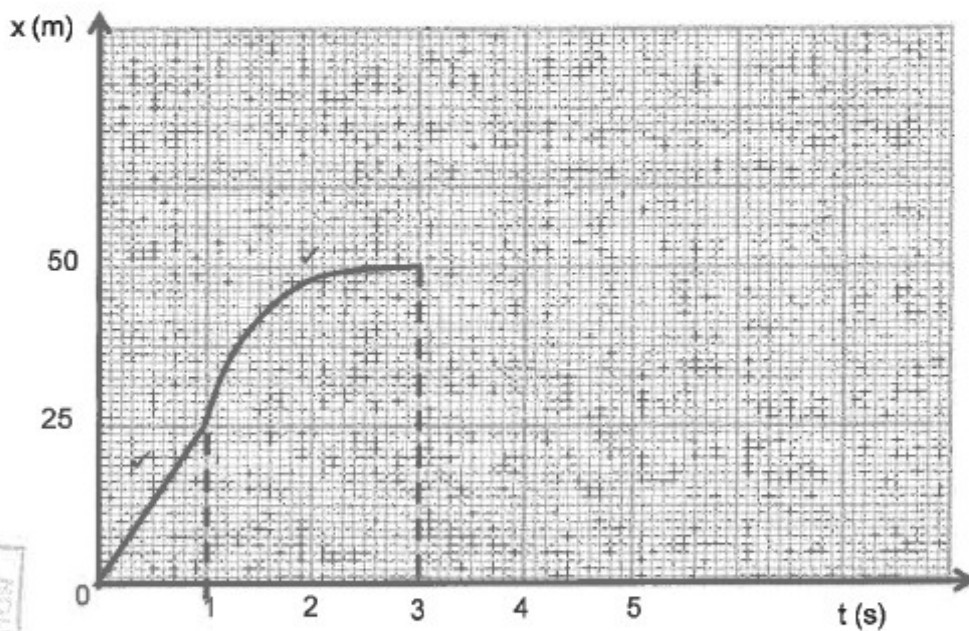*Slegs een punt vir enige een van die vergelykings.*

(5)

OPTION /OPSIE 4

$$\Delta y = \frac{(v_f + v_i)}{2} \Delta t \checkmark$$

$$15 = \frac{25 + 0}{2} \checkmark \times \Delta t \checkmark$$

$$\Delta t = 1,2 \text{ s} \checkmark$$

Actual time to reach traffic light is 1,2s which is shorter than the 2s. Therefore the <u>taxi will not stop in time</u>. ✓

Eintlike tyd of verkeerslig te bereik is 1,2s wat korter is as 2s. Dus sal die taxi <u>nie betyds stop nie.</u>

3.6

MARKING GUIDELINES/*NASIENRIGLYNE*
✓ Both axes correctly labelled with unit
Beide asse korrek benoem met eenheid
✓ Straight line (t =0 s and t = 1 s)
Reguitlyn (t =0 s en t = 1 s)
✓✓Curve shape (t = 1 s and t = 3)
Kurwe (t =1 s en t = 3)
✓ values for displacement and time indicated
Waardes vir verplasing en tyd aangedui

(4)
[17]

QUESTION 4/VRAAG 4

4.1   5 m·s⁻¹ ✓north ✓ (accept range from 4,9 to 5,1)
       5 m·s⁻¹ noord (aanvaar vanaf 4,9 tot 5,1)   (2)

4.2   8,3 m·s⁻¹ ✓✓ (accept range from 8,2 to 8,4)
       8,3 m·s⁻¹ (aanvaar vanaf 8,2 tot 8,4)   (2)

4.3.1
- The velocity is uniformly increasing.
- Velocity increases from 5 m·s⁻¹ to 10 m·s⁻¹ in 150 s.
- Positive acceleration.
- The girl is speeding up.
- The girl is uniformly accelerating

> Any **ONE** of the options ✓✓
> *Enige **EEN** korrekte opsie*

- *Snelheid neem uniform toe.*
- *Snelheid neem van 5 m·s⁻¹ tot 10 m·s⁻¹ in 150 s toe.*
- *Positiewe versnelling.*
- *Die meisie se spoed neem toe.*
- *Die meisie se versnelling is uniform.*   (2)

4.3.2
- Uniform/constant velocity
- Zero acceleration
- Same speed / velocity

> Any **ONE** of the options ✓✓
> *Enige **EEN** korrekte opsie*

- *Uniforme/konstante snelheid*
- *Nil versnelling*
- *Dieselfde spoed/ snelheid*   (2)

4.4.1

OPTION 1/OPSIE 1	OPTION 2/OPSIE 2
Distance A to C *Afstand A tot C* = ℓ x b + ½ x b x h✓ = 5 x 350 ✓ + ½ x 150 x 5✓ = 2 125 m ✓	Distance A to C *Afstand A tot C* = ℓ x b + ℓ x b + ½ x b x h✓ = 200 x 5 + 150 x 5✓ + ½ x 150 x 5✓ = 2 125 m ✓

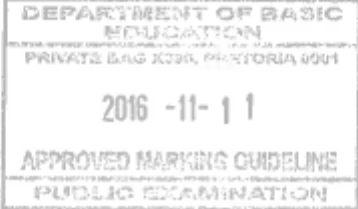| OPTION 3/OPSIE 3 |
|---|
| Distance A to C
Afstand A tot C
= ℓ x b + ½ (sum of parallel sides)h✓
= ℓ x b + ½ (som van parallele sye)h✓
= 5 x 200 ✓ + ½ (5 + 10)(150) ✓
= 2 125 m ✓ |

(4)

4.4.2   Gradient of this graph is the acceleration

$$\text{gradient} = \frac{y_2 - y_1}{x_2 - x_1} \checkmark \text{ or } \frac{v_f - v_i}{t_f - t_i}$$

$$= \frac{(0 - 10) \checkmark}{(65 - 0) \checkmark}$$

$$= -0,15 \text{ m·s}^{-2}$$

∴ a = 0,15 m·s⁻² South✓/ *Suid*   (4)

4.5   D to E. ✓✓
       D tot E   (2)

4.6   The change in speed from D to E is (-)10 m·s^{-1} ✓ and that occurs over (65 s) a shorter period. ✓
       OR
       From B to C, the change in speed is 5 m·s^{-1} over a period of 150 s.✓✓
       OR
       Gradient is the steepest

       Die verandering is spoed van D tot E is (-)10 m·s^{-1} ✓en die beweging gebeur oor 'n korter tydperk.(65 s)✓
       OF
       Vanaf B tot C is die verandering in spoed 5 m·s^{-1} oor 'n tydperk van 150 s.
       OF
       Gradient is die steilste   (2)
                                           [20]

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1.1   B ✓✓   (2)

1.2   A ✓✓   (2)

1.3   C ✓✓   (2)

QUESTION 2/*VRAAG 2*

2.1   A vector is a physical quantity which as both magnitude✓ and direction✓
       'n Vektor is 'n fisiese hoeveelheid wat beide grootte en rigting het.   (2)

2.2   **TAKE EAST AS POSITIVE**   **OR/*OF***
       NEEM OOS AS POSITIEF   **TAKE WEST AS POSITIVE**
       $F_{res} = F_{mbike/fiets} + F_f$✓   ***NEEM WES AS POSITIEF***
       $\quad = (-500\ N + 150\ N)$✓ $F_{res} = F_{mbike/fiets} + F_f$✓
       $\quad = -350\ N$ $\quad = (500\ N - 150\ N)$✓
       $\quad = \underline{350\ N\ westward/weswaarts}$✓ $\quad = 350\ N$
                                            $\quad = \underline{350\ N\ westward/weswaarts}$✓
                                                                                           (3)

2.3   0 km✓ [must include unit/*moet eenheid bevat*]   (1)

2.4

OPTION 1/*OPSIE 1*	**OPTION 2/*OPSIE 2***
Average speed = $\dfrac{\text{total distance}}{\text{total time}}$ ✓ *Gemiddelde spoed* = $\dfrac{\text{totale afstand}}{\text{totaletyd}}$ $\quad = \dfrac{(160+160)}{(2+1,67)}$ ✓ ✓ $\quad = 87,19\ km\cdot hr^{-1}$✓	speed/afstand = $\dfrac{\text{distance/afstand}}{\text{time/tyd}}$ ✓ speed west = $\dfrac{160}{2} = 80\ km\cdot hr^{-1}$. *spoed wes* speed east = $\dfrac{160}{1,67} = 95,81\ km\cdot hr^{-1}$ ⎫ ✓ *spoed oos* ∴ Average speed = $\dfrac{(80+95,81)}{2}$ ✓ ∴ *Gemid spoed* = $87,91\ km\cdot hr^{-1}$✓

                                                                                           (4)

2.5   **POSITIVE MARKING FROM 2.4**
       POSITIEWE NASIEN VANAF 2.4
       For the westward trip/*Vir die rit weswaarts*:
       80✓ = $(v_{bike/motorfiets} - 8)$ ✓
       $v_{bike/motorfiets} = 88\ km\cdot hr^{-1}$✓

       OR/*OF*
       For eastward trip/*Vir die ooswaartse rit*
       95,8✓ = $(v_{bike} + 8)$ ✓
       $v_{bike/motorfiets} = 87,8\ km\cdot hr^{-1}$✓   (3)
                                                                                           [13]

Vektore, Skalare, Beweging Memo

QUESTION 3/VRAAG 3

3.1   The rate of change of velocity. ✓✓
        Die tempo van verandering van snelheid   (2)

3.2 $54 \text{ km·hr}^{-1} = \dfrac{(54 \times 1000)✓}{(3600)✓}$

        $= 15 \text{ m·s}^{-1}✓$

        OR/OF

        $54 \text{ km·hr}^{-1} = \dfrac{54 ✓}{3,6 ✓}$

        $= 15 \text{ m·s}^{-1}✓$ (3)

3.3   **POSITIVE MARKING FROM 3.2**
        POSITIEWE NASIEN VANAF 3.2
        $v_f = v_i + a\Delta t$✓
        $20✓ = 0 + (2)\Delta t$✓
        $\Delta t = 10 \text{ s}$✓   (4)

3.4 **POSITIVE MARKING FROM 3.2 AND 3.3**
POSITIEWE NASIEN VANAF 3.2 EN 3.2
For the police car/*Vir die polisiemotor*
$\Delta x = v_i \Delta t + \frac{1}{2} a\Delta t^2$ ✓
$\quad = [0 + \frac{1}{2}(2)(10^2)]$ ✓
$\quad = 100$ m

For the van/*Vir die paneelwa*
$\Delta x = v_i \Delta t$ ✓
$\quad = (15 \times 10)$ ✓
$\quad = 150$ m
The van ✓ is ahead./*Die paneelwa is voor.* (5)

3.5 Both the van and the police car are at the same position when they catch up..
Beide die paneelwa en die polisiemotor is by dieselfde posisie wanneer hulle mekaar inhaal.

$\therefore$ $x_{police\ car/polisiemotor} = x_{van/paneelwa}$ ✓
For the police car/*Vir polisiemotor:*
$(x_p - 100) = v_f \Delta t\ldots\ldots\ldots\ldots(1)$
$(x_p - 100) = 20 \Delta t$ ✓

For the van/*Vir paneelwa*
$(x_r - 150) = 15 \Delta t$ ✓ $\ldots\ldots\ldots(2)$
$\Delta t = 10$ s

$\therefore x_p = \underline{100 + (20)(10)}$ ✓
$\quad = 300$ m

OR/*OF*
$x_r = [150 + 15(10)]$ ✓
$\quad = 300$ m

The police car catches up with the van after 300 m ✓ after 20 s ✓
Die polisiemotor haal die paneelwa na 300 m en na 20 s in (5)

3.6 Total time/*Totale tyd* = (10 + 10)s = 20 s ✓ (1)
[20]

Vektore,

QUESTION 4/VRAAG 4

4.1   30 m·s^{-1}✓✓   (2)

4.2   40 m·s^{-1}✓✓   (2)

4.3   The speed decreases ✓uniformly (from 40 m·s^{-1} to 0 m·s^{-1}) ✓
Die spoed neem uniform af (vanaf 40 m·s^{-1} tot 0 m·s^{-1})

OR/OF
The car slows down✓ and finally stops✓
Die motor beweeg stadiger en stop uiteindelik.   (2)

4.4 $a = \dfrac{\Delta y}{\Delta x}$ ✓

$= \dfrac{(0) - 40}{25 - 20}$ ✓ ✓

$= -8$ m·s^{-2}✓   (4)

4.5   Equal to/*Gelyk aan*✓
Same gradient /*Dieselfde gradiënt*✓   (2)

4.6   **OPTION 1/OPSIE 1**
Displacement = Area under the v-t graph✓
Verplasing = Oppervlakte onder v-t grafiek

$= (A_{trapezium} + A_{rectangle/reghoek} + A_{triangle\ 1/driehoek\ 1}) - A_{triangle\ 2/driehoek\ 2}$
$= \tfrac{1}{2}(40+30)(5)$✓ $+(15\times40)$ ✓ $+ \tfrac{1}{2}(5 \times40)$✓ $- [\tfrac{1}{2}(2{,}5 \times 20)]$✓
$= 850$ m✓ east/*oos*✓   (7)

OR/OF
Displacement= Area under the v-t graph✓
Verplasing = Oppervlakte onder v–t grafiek

$= (A_{trapezium/trapesium} + A_{rectangle/reghoek} + A_{triangle/driehoek}) - A_{triangle/driehoek}$
$= \tfrac{1}{2}(20+15)(10)$✓ $+ (30 \times 20)$✓ $+ \tfrac{1}{2}(5 \times40)$ ✓ $- \tfrac{1}{2}(2{,}5 \times 20)$✓
$= 850$ m✓ east/*oos*✓   (7)

                                                    [19]