NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1, 2003

Physics: Demonstrate understanding of motion in one dimension (90183)

National Statistics

Assessment Report

Assessment Schedule

Physics: Demonstrate understanding of motion in one dimension (90183)

National Statistics

Number of	Percentage achieved			
Results	Not Achieved	Achieved	Merit	Excellence
2,404	14.9%	43.5%	27.7%	13.9%

Assessment Report

General Comments

Every candidate for a National Certificate of Educational Achievement examination paper is expected to:

- read the question and do what the question asks
- allow adequate time to complete answers
- be accurate: check and/or proofread
- use appropriate technical terms
- bring the correct equipment
- write and/or draw clearly
- use pen if work is to be eligible for reconsideration.

Candidates need to use the correct data for solving problems. For example, Question 1(e) was poorly done by many candidates; only a few used the correct quantity of displacement, most used distance.

Answers need to be clear and precise. For instance, in Question 1(g) the answer was 'downhill'; some candidates supplied an insufficient explanation of 'A hill' or 'A slope'. For the long written answer questions a full explanation is required. For example the answer to Question 2(e)(ii) required a statement that the shoes were of equal mass or had an equal weight. Rewording and therefore repeating a sentence does not mean the answer is now correct.

Candidates should be aware that both poor grammar and handwriting can adversely impact on the effectiveness of their evidence.
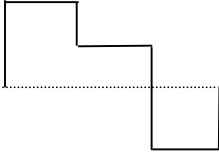
Assessment Schedule

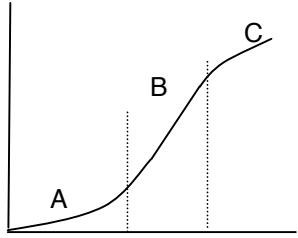**Physics: Demonstrate understanding of motion in one dimension (90183)**

Evidence Statement

Note: Minor computational errors will not be penalised. A wrong answer will be accepted as correct provided there is sufficient evidence that the mistake is not due to a lack of understanding. Such evidence includes:
- the last written step before the answer is given has no unexpanded brackets or terms and does not require rearranging
- the power of any number that is multiplied by a power of 10 is correct.

Italics indicate replacement evidence.

Question	Evidence	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence	Code
1(a)		Diagram is drawn correctly. Scale not required.			A_1
1(b)	Distance = 6.0 + 4.0 + 3.0 + 4.0 + 6.0 + 4.0 + 3.0 = 30.0 km	Correct answer and working.			A_2
1(c)	$v = \dfrac{\Delta d}{\Delta t} = \dfrac{30.0}{2.0} = 15 \text{ km h}^{-1}$	Correct answer and working. *Consequential to 1 (b).*			A_2

1(d)	The distance is the length of the path that they actually followed whereas their displacement is the straight line distance from start to finish.	*Either distance or displacement correctly defined. (Reversal of definitions not to be accepted.)*	Explanation is correct. *No consequential evidence.*		A_1 M_1
1(e)	$v = \dfrac{\Delta d}{\Delta t} = \dfrac{12.0 \times 1000}{2.0 \times 60 \times 60} = 1.7$ $(m\ s^{-1})$	*Merit*	*Displacement (12.0 m) calculated correctly or Velocity calculated consequentially.*	Calculation correct in $m\ s^{-1}$	M_2 E_2
1(f)	(i) Accelerating (ii) Constant speed (iii) Decelerating	Two sections described correctly.			A_1
1(g)	Downhill	Correct written explanation.			A_1
1(h)	 Graph line curves upwards, straightens then curves the other way.	Correct shape in any one of the three sections.	Correct shape between correct co-ordinates in any two of the three sections.	All three sections of the graph are drawn correctly *and* the graph line is smooth, continuous (no sharp angles at boundaries), is asymptotic at start and finish (since v = 0).	A_1 M_1 E_1

1(i)	$a = \dfrac{\Delta v}{\Delta t} = \dfrac{0 - 10}{50 - 20} = \dfrac{-10}{30}$ $\Rightarrow a = -0.33 \text{ m s}^{-2}$	*An attempt at evaluating the gradient of the graph.*	*Correct numerical value but negative sign omitted.*	Correct value, including negative sign OR positive value with statement that it is deceleration.	A$_2$ M$_2$ E$_2$
1(j)	Distance = area of triangle under graph = ($\frac{1}{2} \times$ 30 $\times$ 10) = 150 m	*Merit*	Correct answer		M$_2$
1(k)	W = Fd = 180 $\times$ 100 = 18 000 J	Correct working and answer with unit			A$_2$
1(l)	$P = \dfrac{W}{t} = \dfrac{18000}{50} = 360$ W	*Merit. Consequential to 1 (k).*	Correct answer with unit		M$_2$
2(a)	Resultant speed = 3.0 m s^{-1}	*Merit*	Correct answer for resultant speed		M$_2$
2(b)	$a = \dfrac{F}{m} = \dfrac{20}{0.42} = 48$ m s^{-2}	*Merit*	Correct answer		M$_2$
2(c)	E_P = mgΔh = 0.42 $\times$ 10 $\times$ 6.0 = 25.2 J	Correct working and answer with unit			A$_2$
2(d)(i	Kinetic energy	Correct answer			A$_1$
(ii)	E_P lost = E_K gained $25.2 = \frac{1}{2}mv^2 = \frac{1}{2} \times 0.42 \times v^2$ $\Rightarrow v^2 = \dfrac{2 \times 25.2}{0.42} = 120$ $\Rightarrow v = \sqrt{120} = 11$ m s^{-1}	*Merit. Consequential to 2 (c).*	*Principle of energy conservation recognised*	Correct answer	M$_2$ E$_2$
2(e) (i)	The area of Hone's shoes in contact with the surface of the field is less than the area of Tom's shoes. Since they both exert the same force and pressure is the force on unit area, Hone exerts more pressure.	*Some indication that pressure depends on area.*	*Some indication that Hone's shoes have less contact area and that their weights are the same.*	Correct explanation	A$_1$ M$_1$ E$_1$
(ii)	Weight = mg = 60 $\times$ 10 = 600 N	Correct working and answer with unit.			A$_2$
(iii)	$P = \dfrac{F}{A} = \dfrac{600}{1.6 \times 10^{-3}}$ = 375 000 Pa (or N m^{-2}) = 380 000 Pa	*Merit. Consequential to 2 (e) (ii).*	Correct answer with unit		M$_2$

2(f)(i)	Terminal velocity	Correct answer			A_1
(ii)	The skydiver is travelling at constant speed because the upward force due to friction (air resistance) balances the downward force of gravity (his weight). Since there is no resultant force, there is no acceleration.	*Forces are identified by name.*	*Statement that there is no acceleration because the (named) forces are balanced*	Correct explanation, including the directions of the forces. Downwards and upwards must be mentioned.	A_1 M_1 E_1
TOTAL		$9 \times A_1$ $6 \times A_2$	$4 \times M_1$ $8 \times M_2$	$3 \times E_1$ $3 \times E_2$	

Judgement Statement

Judgement statements (formerly referred to as sufficiency statements) help students understand how their overall results for each standard were arrived at.

Achievement	Achievement with Merit	Achievement with Excellence
$9 \times$ **A** including $2 \times A1$ and $2 \times A2$	Achievement *plus* $8 \times$ **M** including $1 \times M1$	Merit *plus* $4 \times$ **E**

Holistic Judgement
If required, sufficiency may be obtained to a lower level of achievement by taking into account supplementary evidence form higher levels of achievement. Criterion one can only replace criterion one and criterion two can only replace criterion two.