NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 2, 2004

Science

Describe aspects of New Zealand's endemic life (90314)

Describe naturally occurring organic mixtures and the production of derived consumer products (90315)

Describe New Zealand's geological history and processes, and the nature and life cycle of stars (90316)

Use physics to describe the operation of technological devices, and to solve problems (90317)

National Statistics

Assessment Report

Assessment Schedule

Science, Level 2, 2004

General Comments

There was a significant improvement in performance by candidates in all areas this year. Biology and physics were well done, and there was a pleasing improvement in chemistry and geology / astronomy.

Most candidates had a better understanding of the content of the exams.

More candidates this year were better able to link ideas and hence a larger number gained Achievement with Merit and Achievement with Excellence. For this, it is necessary to read the questions for meaning, learn the basic terms as outlined in the explanatory notes, and learn to explain links between aspects of the question.

It is important that candidates attempt all questions in the papers.

Many candidates were able to reach the Excellence level in one question, but failed to show sufficient breadth of information to do so for the whole paper.

Science: Describe aspects of New Zealand's endemic life (90314)

National Statistics

Number of Results	Percentage			
	Not Achieved	Achieved	Merit	Excellence
1,478	39.8%	49.6%	7.8%	2.8%

Assessment Report

The paper was generally well done. Candidates who gained Achievement were able to describe evolution and the processes involved. They had read the explanatory notes and this was necessary to answer the first half of the paper. Conservation was generally well done.

Candidates who gained Achievement with Merit or Achievement with Excellence, were able to link the processes of evolution to New Zealand examples. Geological and biological factors were also explained. Excellence candidates were also able to link the processes of conservation to the effectiveness of the methods chosen.

Candidates assessed as Not Achieved did not understand the key terms as contained in the explanatory notes and in particular: bottlenecks, geological factors and the relationship between geological factors and evolution.

It is important that candidates carefully read the questions for meaning.

Assessment Schedule

Science: Describe aspects of New Zealand's endemic life (90314)

Evidence Statement

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
Criterion 1 (Q1, Q2)	Describe the evolution of New Zealand plants and animals including the factors and processes involved.	Make reasoned links between the factors and the processes involved in the evolution of New Zealand plants and animals.	Make valid generalisations by applying the linked factors and processes to a wider group of New Zealand plants and animals.
	Holistic judgement A student can describe the evolution of the hebes **OR** the kea.	**Holistic judgement** A student can explain the evolution of the hebes **OR** the kea.	**Holistic judgement** A student can discuss the evolution of the hebes **OR** the kea.
1(a)	Change in size of leaves **OR** leaves closer to stem in alpine **OR** smaller flowers **OR** smaller plants **OR** size only.		
1(b)	Killed off some populations **OR** left few surviving individuals.	Killed off some populations **AND** left few surviving individuals.	
1(c)	Small leaves **OR** small flowers **OR** small plant size (any adaptation to cold).	Small leaves **OR** small flowers **OR** small plant size **AND** link to reduce water loss or heat loss or adaptation to alpine environment.	
1(d)	Formed lots of different hebe species.	Several different populations evolved with different allele frequencies.	Several different populations evolved with different allele frequencies **AND** over time lead to new species.
2(a)	Any valid geological factors leading to separation eg mountain building, ice age, climate change. **(2 required)**		
2(b)	New environments only.	Created new environments **AND** separated isolated populations from each other **OR** adaptation to cold.	
2(c)	Forest v mountain environment **OR** different breeding seasons **OR** different mating rituals **OR** diffferent physical responses **OR** different hormonal responses **OR** can't form hybrids.	Acheivement with 1 method explained eg if different breeding seasons, won't be able to mate.	Achievement with 2 methods explained and linked to separation of the species.

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
Criterion 2 (Q3, Q4)	Describe the key conditions necessary for the survival of a New Zealand endemic plant or animal.	Explain key conditions necessary for the survival of a New Zealand endemic plant or animal **AND** discuss implications for survival.	Explain, in detail, a range of conditions necessary for the survival of a New Zealand endemic plant or animal, discuss implications **AND** evaluate the chances for survival.
	Holistic judgement A student can describe the key conditions necessary for the survival of the Mt Cook lily **OR** how animals are conserved.	**Holistic judgement** A student can explain the key conditions necessary for the survival of **AND** discuss the implications of the conservation of the Mt Cook lily **AND** how a named animal is conserved.	**Holistic judgement** A student can discuss the key conditions necessary for the survival of **AND** discuss the implications of **AND** evaluate the success of the conservation of the Mount Cook lily **AND** how named animals are conserved.
3(a)	Any valid biological reason eg plants break due to trampling **OR** plants may be eaten **OR** introduce diseases.		
3(b)(i)	Reduce animals **OR** protect areas with fences **OR** restrict stock and humans in risk areas.		
3(b)(ii)		Reduce animals **OR** protect areas with fences **OR** restrict stock and humans in risk areas **AND** allow plant to grow and reproduce successfully.	
3(c)	Survival under threat **OR** special areas needed **OR** can only survive with human intervention **OR** may not be successful **OR** small gene pool.	Predator elimination **OR** special areas needed **OR** small gene pool **AND** can only survive with human intervention **OR** may not be successful.	Survival under threat **AND** special areas needed **AND** small gene pool **AND** can only survive with human intervention **AND** may not be successful with reasons eg harsh winters.
4	Named NZ endemic animal given **AND** 1 of special areas, predator elimination, selective breeding **AND** effectiveness of one method required.	Named NZ endemic animal given **AND** 2 of special areas**,** predator elimination, selective breeding, education **AND** effectiveness of two methods required.	Named NZ endemic animal given **AND** 3 of special areas**,** predator elimination**,** selective breeding, education, **AND** effectiveness of all methods required.

Judgement Statement

Criterion 1 (Questions 1 and 2)

Achievement:

Total of 4 opportunities answered at Achievement (or higher) from questions 1 and 2.

4 × A1

Achievement with Merit:

Total of 4 opportunities answered with 3 at Merit level (or higher) **and** 1 at Achievement level

3 × M1 + 1 × A1

Achievement with Excellence:

Total of 4 opportunities answered with 1 at Excellence level **and** 2 at Merit level **and** 1 at Achievement level

1 × E1 + 2 × M1 + 1 × A1

Criterion 2 (Questions 3 and 4)

Achievement:

Total of 2 opportunities answered at Achievement (or higher) from questions 3 and 4.

2 × A2

Achievement with Merit:

Total of 2 opportunities answered with 2 at Merit level (or higher)

2 × M2

Achievement with Excellence:

Total of 2 opportunities answered with 1 at Excellence level **and** 1 at Merit level

1 × E2 + 1 × M2

Science: Describe naturally occurring organic mixtures and the production of derived consumer products (90315)

National Statistics

Number of Results	Percentage			
	Not Achieved	Achieved	Merit	Excellence
1,056	65.9%	29.5%	4.5%	0.0%

Assessment Report

The paper was generally not well done, although it showed a marked improvement over 2003.

Candidates who gained Achievement were able to describe compounds and the key steps in the production of consumer products, and were able use the key trigger words, "name or structure".

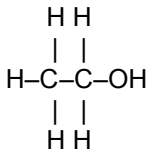
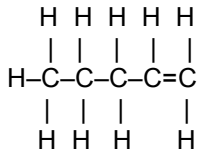
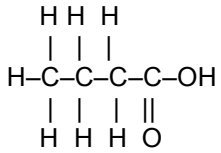
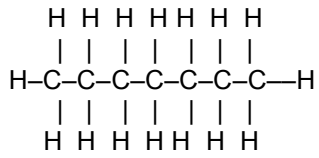
Candidates who gained Achievement with Merit were those who had a good knowledge of the explanatory notes, and used terminology appropriately and correctly. No candidate gained Achievement with Excellence, because of the complex linking required by the standard. We expect that the wording of the new standard will address this issue.

Candidates assessed as Not Achieved, could not name or draw simple organic compounds, though these are prescribed in the explanatory notes. They had little or no knowledge of derived consumer products such as petroleum, natural gas or plant extracts (EN3). It is important that candidates read questions carefully for meaning.

Assessment Schedule

Science: Describe naturally occurring organic mixtures and the production of derived consumer products (90315)

Evidence Statement

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
1(a)(i)			
1(a)(ii)	Octane		
1(iii)	 any straight chained isomer		
1(iv)	Butanol		
1(v)	 (3 required) **A1**		
1(b)	Heptane **OR**  **A1**		
2(a)	Crude oil is a complex mixture/ straight out of the ground but refined oil is a simple mixture/has been processed (not refined). **A1**		
2(b)	Different oils contain different mixtures **OR** have different unique properties/used for different purposes. **A1**	Different oils contain different mixtures **AND** have different unique properties. **M1**	
2(c)	Stable **OR** liquid **OR** easy to transport and store **OR** high energy **OR** easy to vaporise **OR** clean burning **OR** easily combustable. **A1**	Stable **OR** liquid **AND** easy to transport and store **AND** high energy **OR** easy to vaporise. (3 required) **M1**	Stable **AND** liquid **AND** easy to transport and store **AND** high energy **AND** easy to vaporise. (required or inferred) **E1**

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
3(a)	1 carbon atom only. **A1**		
3(b)	1, +2 **OR** 1, +2 one balanced **A2**	1, +2 **AND** 1, + 2 both balanced **M2**	
3(c)	Sewage digested by bacteria. **A2**	Sewage digested by bacteria **AND** methane a waste product. **M2**	
4(a)	…. yeast → alcohol + CO_2 **A2**		
4(b)	Solvent, disinfectant or any other reasonable use. **A2**		
4(c)	Yeast fermentation. **A2**	Yeast digests sugars for energy during fermentation releasing alcohol as waste product. **M2**	
4(d)	Wine left for longer to ferment **OR** different yeast used **OR** starting plant material used has different level of sugar present **OR** beer simple fermentation **OR** wine complex two-stage fermentation. **A2**	Refers to both Beer and Wine. **M2**	Refers to both Beer and Wine and 2 points for each. **E2**
5(a)	Vaporises all hydrocarbons. **A2**	Vaporises all hydrocarbons **AND** ensures separation of all the fractions. **M2**	
5(b)(i) (ii) (iii) (iv) (v)	Methane Petrol Av-gas Oil Tar **A2**		
5(c)	Breaks long chains. **A2**	Breaks long chained hydrocarbons into smaller (alkanes) chains of which one is petrol. **M2**	
5(d)	Ethene **A2**	H_2–C=C–H_2 **M2**	
5(e)	Polythene / Polyethene **A2**	•–C–C–C–C–C–C–C–C–• (all the H's need to be in here) **M2**	
5(f)	High temperatures **OR** high pressure **OR** catalysts. **A2**	High temperatures **AND** high pressure **OR** catalysts **AND** break bonds. **M2**	High temperatures **AND** high pressure **AND** catalysts (2 conditions) cause bonds to break and reform as smaller, more stable units. **E2**

Judgement Statement

Criterion 1

Achievement:

Total of 3 opportunities answered at Achievement (or higher)

3 × A1

Achievement with Merit:

Total of 3 opportunities answered with 1 at Merit level (or higher) **and** 2 at Achievement level

1 × M1 + 2 × A1

Achievement with Excellence:

Total of 3 opportunities answered with 1 at Excellence level **and** 1 at Merit level **and** 1 at Achievement level

1 × E1 + 1 × M1 + 1 × A1

Criterion 2

Achievement:

Total of 6 opportunities answered at Achievement (or higher)

6 × A2

Achievement with Merit:

Total of 6 opportunities answered with 3 at Merit level (or higher) **and** 3 at Achievement level

3 × M2 + 3 × A2

Achievement with Excellence:

Total of 6 opportunities answered with 1 at Excellence level **and** 2 at Merit level **and** 3 at Achievement level

1 × E2 + 2 × M2 + 3 × A2

Science: Describe New Zealand's geological history and processes, and the nature and life cycle of stars (90316)

National Statistics

Number of Results	Percentage			
	Not Achieved	Achieved	Merit	Excellence
1,067	54.7%	34.4%	7.6%	3.3%

Assessment Report

The paper was an improvement over last year with many more students gaining Achievement with Merit and Achievement with Excellence.

Candidates who gained Achievement were able to able to describe New Zealand's geological history and describe how stars are classified. They needed to answer both sections, and knowledge of the H-R diagram was essential.

Candidates who gained Achievement with Merit or Achievement with Excellence were able to link the various orogenic phases to New Zealand's geological history, link the last ice age to the Kaikoura Orogeny, and were able to work out what happened to Achernar to lose mass to become a white dwarf.

Some of the candidates assessed as Not Achieved did well in one of the sections, geology or astronomy, but the standard required **both** aspects to be demonstrated. For 2005 these topics become separate papers. Candidates need to read the explanatory notes attached to the standard. Knowledge of basic terms such as orogeny, was lacking.

Assessment Schedule

Science: Describe New Zealand's geological history and the processes, and the nature and life cycle of stars (90316)

Evidence Statement

Q	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
Part A Criterion 1 (Q1 & Q2)			
1(a)	Indo-Australian **AND** W-E motion **OR** Pacific **AND** E-W motion any order 1 plate correct **OR** both plates correctly identified.		
1(b)	Tuhua was NZ first orogney.	NZ built from deposition onto Eastern coast of Gondwanaland and hence west oldest to east youngest.	
1(c)(i) 1(c)(ii)	Fan formed in deep water with sediments off Gondwanaland **OR** erosion. Volcano **OR** island (one required).		
1(d)	Inference to subduction zone **OR** trench necessary for Rangitata sediments **OR** Mountain Orogney **OR** weathering / erosion.	Subduction zone **AND** sediments built up in the trench **OR** build up into mountains.	Subduction zone **AND** off E coast Gondwanaland **AND** sediments carried into trench and built up **AND** built up into mountains.
1(e)	Mountain building lifts the Rangitata rocks.	Mountain building lifts Rangitata rocks **AND** rate of uplift greatest near Alpine fault **OR** Southern Alps.	
2(a)	Moraine **OR** till **OR** u-shaped valleys. (valid glacial feature).		
2(b)	Higher erosive ability of ice **OR** colder temperatures freeze thaw action.	Higher erosive ability of ice **AND** colder temperatures freeze thaw action.	
2(c)	Lifted mountains up to higher altitudes.	Lifted mountains up to higher altitudes **AND** exposed rocks to erosive ability of ice rather than water.	Lifted mountains up to higher altitudes **AND** exposed rocks to erosive ability of ice **AND** acted as a barrier to the westerly wind systems **OR** increasing precipitation.

<table>
<tr><th>Q</th><th>Evidence contributing to Achievement</th><th>Evidence contributing to Achievement with Merit</th><th>Evidence contributing to Achievement with Excellence</th></tr>
<tr><td rowspan="2">Part B
Criterion 2
(Q3 and Q4)</td><td>Describe how stars are classified and describe their life cycles.</td><td>Link star types and their characteristics to their life cycles.</td><td>Explain links between the nature and life cycles of stars.</td></tr>
<tr><td>Holistic judgement statement
The student has an understanding that there are different types of stars which are described by several different characteristics.</td><td>Holistic judgement statement
The student can connect two stages or characteristics of a star's life. M2</td><td>Holistic judgement statement
The student understands the causes and/or the consequences of a star's nature. E2</td></tr>
<tr><td>3</td><td>M Class OR dwarf star OR < 3000° OR ≈ 0.0001 brightness of Sun.
1 required</td><td></td><td></td></tr>
<tr><td>4</td><td><table><tr><th>Characteristics</th><th>Sun</th><th>Achernar</th></tr><tr><td>Mass (Suns)</td><td>× 1</td><td>× 6</td></tr><tr><td>Size (Suns)</td><td>× 1</td><td>× 12</td></tr><tr><td>Colour</td><td>Yellowish-white</td><td>Blue</td></tr><tr><td>Surface Temperature</td><td>5400 ±1000</td><td>20 000 ±1000</td></tr><tr><td>Spectral Type</td><td>G</td><td>B</td></tr></table>1 surface temperature corrrect AND 1 spectral type correct.</td><td></td><td></td></tr>
<tr><td>5</td><td>Blue or white hot is hotter than red hot AND blue Achernar is hotter than yellow-white Sun.</td><td></td><td></td></tr>
<tr><td>6</td><td>Stars are formed from big clouds of gas (or hydrogen) that squeeze together by gravity.</td><td>Big clouds of gas/hydrogen that squeeze together by gravity AND centre gets hot.</td><td>Big clouds of gas/hydrogen squeeze together by gravity AND centre gets hot AND finally starts to 'burn'/fuse AND then it is a star.</td></tr>
<tr><td>7</td><td>Greater mass OR higher temperatures AND shorter lifetimes.</td><td>Greater mass AND higher temperatures AND shorter lifetimes.</td><td>Larger mass then more compact (denser) star's core because of stronger gravity AND star will be hotter (higher temperature) AND 'burn'/fuse faster (use up fuel quicker). (Our Sun will live longer than Achernar.)</td></tr>
<tr><td>8</td><td><table><tr><th>Star Types</th><th>Fuels</th></tr><tr><td>Main Sequence</td><td>Hydrogen</td></tr><tr><td>Red Giant</td><td>Helium</td></tr><tr><td>Super Giant</td><td>Carbon & Oxygen</td></tr><tr><td>Supernova</td><td>Iron</td></tr><tr><td>White Dwarf</td><td>None</td></tr></table>(at least 3 correct)</td><td></td><td></td></tr>
<tr><td>9</td><td>Achernar's helium is used up AND outer layers puff off OR forms a planetary nebula.</td><td>Achernar's helium is used up AND its core shrinks to become a white dwarf AND the heat produced is only enough to puff off outer layers.</td><td></td></tr>
</table>

Judgement Statement

Criterion 1 (Part A)

Achievement:

Total of 4 opportunities answered at Achievement (or higher)

4 × A1

Achievement with Merit:

Total of 4 opportunities answered with 2 at Merit level (or higher) **and** 2 at Achievement level

2 × M1 + 2 × A1

Achievement with Excellence:

Total of 4 opportunities answered with 1 at Excellence level **and** 1 at Merit level **and** 2 at Achievement level

1 × E1 + 1 × M1 + 2 × A1

Criterion 2 (Part B)

Achievement:

Total of 4 opportunities answered at Achievement (or higher)

4 × A2

Achievement with Merit:

Total of 4 opportunities answered with 2 at Merit level (or higher) **and** 2 at Achievement level

2 × M2 + 2 × A2

Achievement with Excellence:

Total of 4 opportunities answered with 1 at Excellence level **and** 1 at Merit level **and** 2 at Achievement level

1 × E2 + 1 × M2 + 2 × A2

Science: Use physics to describe the operation of technological devices, and to solve problems (90317)

National Statistics

Number of Results	Percentage			
	Not Achieved	Achieved	Merit	Excellence
1,833	32.7%	46.9%	10.1%	10.3%

Assessment Report

The paper was generally well done and had a larger cohort than the other standards. The standard showed an increase in the Achievement rate from 2003. This standard had the highest percentage of Merit and Excellence grades, which is possibly due to physics students taking this standard.

Candidates who gained Achievement were able to identify physics principles / concepts in the operation of technological devices, and were able to solve physics problems. Ray diagrams were well-drawn.

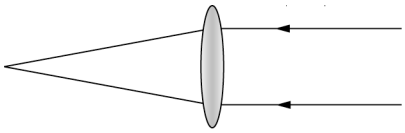
Candidates who gained Achievement with Merit or Achievement with Excellence were able to give correct units to numerical answers, and their answers showed explanations or analysis of physics concepts.

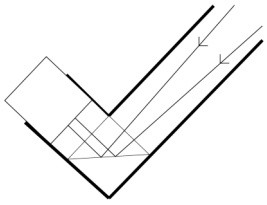
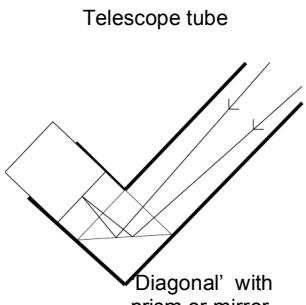
Candidates assessed as Not Achieved, confused the relationship between kinetic and gravitational potential energy. They had difficulty solving formulae, especially substituting data into formulae. These candidates often did not give the units with numerical answers, and ray diagrams were poorly drawn. Candidates need to be aware of the requirements included in the explanatory notes of the standard.

Assessment Schedule

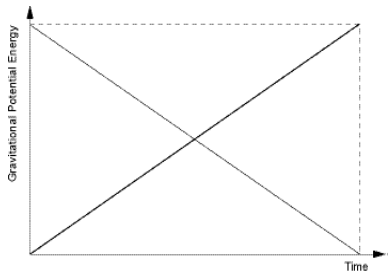
Science: Use physics to describe the operation of technological devices, and to solve problems (90317)

Evidence Statement

Question	Achievement	Achievement with Merit	Achievement with Excellence
PART A – The Telescope			
1	$focal\ ratio = \frac{f}{a}$ $\Rightarrow f = a \times focal\ ratio$ $\Rightarrow = 0.10 \times 15$ $\Rightarrow = 1.5$ m **A2**		
2(a) 2(b)	1.5 m/focal point **OR**  **A1**	**BOTH** required **M1**	
3(a)	Correct formula and substitution only. **A2**	d_o = 20 m f = 1.5 m d_i = ? $\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$ $\frac{1}{d_i} = \frac{1}{1.5} + \frac{1}{20}$ = 0.67 – 0.05 = 0.62 d_i = 1.62 m Correct unit and sensible rounding **OR** S_o = 20 or 18.5 m (accept either) f = 1.5 m S_i = ? $S_i\ S_o = f^2$ $S_i = \frac{f^2}{S_o}$ $= \frac{1.5^2}{20}$ or = $\frac{1.5^2}{18.5}$ =0.11 m = 0.12 m ≈ 0.1 m ≈ 0.1 m ⇒ image is 1.5 + 0.1 m = 1.6 m from objective lens **M2**	

Question	Achievement	Achievement with Merit	Achievement with Excellence
3(b)(i) 3(b)(ii)		Figure 3 **AND** Eyepiece pulled further out but no reason why **OR** Figure 2 (due to incorrect answer of 0.62 m in 3(a)) and answer is justified. **M1**	Figure 3 **AND** Eyepiece pulled further out **AND** telescope focused on the 20 m distant object because the image is now 1.6 m from the objective lens instead of 1.5 m for the very distant object (or is now 0.1 m from the focal point). **E1**
4	$magnification = \frac{f_{obj}}{f_{eye}}$ $= \frac{1500}{15}$ $= 100$ **A2**		
5	Real, inverted, diminished. 2/3 correct **A1**		
6	Identify: Light rays need to be **reflected** through 90°. **OR** a prism/mirror used to do this. **A1**	Explain: Light rays need to be **reflected** through 90° **AND** using mirror/prism. **M1**	Light rays need to be **reflected** through 90° (just before they reach the eyepiece) **AND** using mirror/prism) **AND** device (called a 'diagonal' but name not required) inserted where the eyepiece normally goes and the eyepiece inserted into it. **E1**
6		 Diagram correct as per Excellence diagram but light rays are not converging. **M2**	 Diagram shows light rays are converging **E2**

Question	Achievement	Achievement with Merit	Achievement with Excellence
PART B – The Ladder			
7	Correct formula **OR** substitution. **A2**	*Work* = *Fd* = 700 × 4.0 = 2800 J = 3000 J or Nm^{-1} Correct unit. **M2**	
8	Weight × vertical distance/Work done **OR** increase in gravitational potential energy **OR** relationship between the two is correctly described. **A1**	Weight × vertical distance/Work done **AND** Is equal to increase in gravitational potential energy. **M1**	
9	Converted to kinetic energy. **A1**	Kinetic energy **AND** other forms of energy (don't need to be specified) eg sound/heat **M1**	
PART C – The Lift			
10(a)	Correct formula chosen only. **A2**	$\Delta E_p = mgh$ = 1000 × 10 × 120 = 1 200 000 J / 1200kJ Correct unit. **M2**	
10(b)	(b) Either correct formula **OR** substitution chosen. **A2**	Correct time calculation. *t* = 30 s **OR** Power calculation correct with incorrect time (not 4) Correct unit. **M2**	$P = \frac{E}{t}$ $= \frac{1200\,000}{30}$ = 40 000 W = 40 kW Correct unit. W or kW ok. **E2**

Question	Achievement	Achievement with Merit	Achievement with Excellence
11(a)	 Line straight **AND** from origin to correct position (small discrepancies allowed). **OR** correct trend shown. **A2**		
11(b)	Balance the lift. Can be inferred. **OR** Only a small amount of energy to drive the lift up or down. **OR** The lift's increasing potential energy comes from the counterweight's decreasing potential energy. (And vice versa; like a seesaw.) **OR** Provides a safety feature to the lift's travel. **A1**	Balance the lift. Can be inferred. **AND** Only a small amount of energy to drive the lift up or down. **OR** The lift's increasing potential energy comes from the counterweight's decreasing potential energy. (And vice versa; like a seesaw.) **M1**	Balance the lift. **AND** Only a small amount of energy to drive the lift up or down. **AND** The lift's increasing potential energy comes from the counterweight's decreasing potential energy. (And vice versa; like a seesaw.) **E1**

Judgement Statement

Criterion 1

Achievement:

Total of 3 opportunities answered at Achievement (or higher)

3 × A1

Achievement with Merit:

Total of 3 opportunities answered with 3 at Merit level (or higher).

3 × M1

Achievement with Excellence:

Total of 3 opportunities answered with 1 at Excellence level **and** 2 at Merit level.

1 × E1 + 2 × M1

Criterion 2

Achievement:

Total of 4 opportunities answered at Achievement (or higher)

4 × A2

Achievement with Merit:

Total of 4 opportunities answered with 3 at Merit level (or higher) **and** 1 at Achievement level

3 × M2 + 1 × A2

Achievement with Excellence:

Total of 4 opportunities answered with 1 at Excellence level **and** 3 at Merit level

1 × E2 + 3 × M2

Note:

For Achievement, at least 2A must come from Light (Part A) and 2A from Energy (Parts B & C).

For Merit, at least 1M must come from Light and 1M from Energy.