



## SAMPLE ASSESSMENT TASKS

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AVIATION  
GENERAL YEAR 12

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## Sample assessment task

### Aviation – General Year 12

#### Task 9 – Unit 4

**Assessment type:** Test

**Conditions**

Time for the task: 60 minutes

**Task weighting**

10% of the school mark for this pair of units

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**Human factors test** (40 marks)

**Section One: Multiple-choice** (10 marks)

1. Above a certain altitude even pure oxygen delivered at atmospheric pressure is inadequate to keep a pilot's blood properly oxygenated. What is this altitude approximately?
  - (a) 10 000 ft
  - (b) 18 000 ft
  - (c) 22 000 ft
  - (d) 34 000 ft
  
2. A diver who takes a flight in an unpressurised aircraft after having been deep scuba diving on the previous day is at risk of suffering decompression sickness while flying. A common symptom of decompression sickness is
  - (a) development of pain in knees and elbows.
  - (b) dizziness.
  - (c) rapid heartbeat.
  - (d) tingling sensations in the finger joints.
  
3. Why should continuous exposure to high noise levels in the cockpit be avoided?
  - (a) stress levels are increased and concentration levels are decreased
  - (b) general pilot performance and efficiency are decreased
  - (c) the effect is cumulative and can eventually lead to deafness
  - (d) all of the above
  
4. In an unpressurised aircraft, discomfort or pain in the ears or sinuses is most likely to occur during
  - (a) high rate of climb.
  - (b) high rate of descent.
  - (c) slow rate of descent.
  - (d) long periods in cruise at high level.

5. Decibels (dB) are units that measure the
- (a) intensity or loudness of a sound.
  - (b) wavelength of a sound wave.
  - (c) pressure of a sound wave.
  - (d) frequency of a sound.
6. Which of the following statements describes the cells responsible for colour vision?
- (a) cone cells, as they are most sensitive at night
  - (b) rod cells, as they are most sensitive at night
  - (c) cone cells, as they are least sensitive at night
  - (d) rod cells, as they are least sensitive at night
7. When light passes through the lens of the eyeball, it is brought to focus on the
- (a) iris.
  - (b) cornea.
  - (c) optic nerve.
  - (d) retina.
8. Which of the following optical conditions occurs naturally due to ageing?
- (a) myopia
  - (b) presbyopia
  - (c) rhodopsin
  - (d) hypermetropia
9. What is the usual field of vision for best visual acuity?
- (a) 1/60 of 1 degree
  - (b) 1/10 of 1 degree
  - (c) 1 degree
  - (d) 2 degrees
10. In an unpressurised aircraft, pilots may begin to notice reduced night visual acuity at
- (a) 2000 ft.
  - (b) 4000 ft.
  - (c) 8000 ft.
  - (d) 10 000 ft.

**Section Two: Short answer**

**(30 marks)**

11. When flying, pilots can be susceptible to strange visual effects and altered perceptions, such as:

- 1. empty field myopia
- 2. autokinesis
- 3. night lights
- 4. failure of depth perception
- 5. height of 'rounding out' when landing on a broad runway.

Select any **three** of the above illusory errors and explain briefly what illusions are experienced and what causes them to occur. (6 marks)

Illusion number \_\_\_\_\_

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Illusion number \_\_\_\_\_

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Illusion number \_\_\_\_\_

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12. Carbon monoxide (CO) is dangerous to aircrew if it enters the cabin of a light aircraft in flight.

(a) Where would the CO gas be likely to have originated in the aircraft? (1 mark)

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(b) What are **two** major symptoms experienced by aircrew suffering from CO poisoning? (2 marks)

One: \_\_\_\_\_

Two: \_\_\_\_\_

(c) CO is extremely poisonous, because it attaches permanently to one component of the blood. Name the blood component affected by CO poisoning. (1 mark)

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13. Safety is the key issue in testing for alcohol and other drugs, including medical and illegal drugs.

(a) List **four** common effects of alcohol on the human body. (4 marks)

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(b) What is the minimum time between drinking alcohol and operating an aircraft? (1 mark)

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(c) Amphetamines are an illegal drug that, when used by some people, are known to make them overly aggressive, assertive and careless. Why would these traits be particularly bad for an airline pilot? (3 marks)

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(d) State the purpose of a drug and alcohol response program. (2 marks)

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14. High gravitational loads can incapacitate a pilot through a loss of consciousness. This is referred to as g-force induced loss of consciousness (G-LOC).

(a) Explain why G-LOC occurs? (3 marks)

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(b) Give **two** examples of circumstances during a flight in which G-LOC may occur. (2 marks)

One: \_\_\_\_\_

Two: \_\_\_\_\_

(c) List **two** factors that increase a pilot's tolerance to high g-forces for short periods. (2 marks)

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(d) List **three** symptoms that may precede a loss of consciousness. (3 marks)

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## Marking key for sample assessment task 9 – Unit 4

### Section One: Multiple-choice

Question	Answer
1	D
2	A
3	C
4	B
5	A
6	C
7	D
8	B
9	A
10	B

### Section Two: Short answer

11. When flying, pilots can be susceptible to strange visual effects and altered perceptions, such as:
1. empty field myopia
  2. autokinesis
  3. night lights
  4. failure of depth perception
  5. height of 'rounding out' when landing on a broad runway.

Select any **three** of the above illusory errors and explain briefly what illusions are experienced and what causes them to occur.

Description	Marks
Any three of the following (cause – 1 mark, effect – 1 mark)	
1. Empty field myopia <ul style="list-style-type: none"> <li>• flying above cloud or at night</li> <li>• eye focuses short and may not see outside objects</li> </ul>	1–2
2. Autokinesis <ul style="list-style-type: none"> <li>• no other visual cues at night</li> <li>• stationary lights may appear to move randomly</li> </ul>	1–2
3. Night lights <ul style="list-style-type: none"> <li>• no visual cues/lack of visual clues on take-off</li> <li>• confusion of stars with ground lights/perception of climbing steeply leads to a tendency to put aircraft into a dive</li> </ul>	1–2
4. Failure of depth perception <ul style="list-style-type: none"> <li>• beyond ~ 6 m the eye loses binocular vision assistance to measure distance</li> <li>• and relies on monocular cues such as parallel lines, relative size, parallax or 'blueness' of distant hills</li> <li>• potentially collide with other objects</li> </ul>	1–2
5. Height of 'rounding out' when landing on a broad runway <ul style="list-style-type: none"> <li>• peripheral vision prompts perception of height by equating it to width of runway</li> <li>• pilots flare too high when landing</li> </ul>	1–2
<b>Total</b>	<b>/6</b>

12. Carbon monoxide (CO) is dangerous to aircrew if it enters the cabin of a light aircraft in flight.

(a) Where would the CO gas be likely to have originated in the aircraft?

Description	Marks
Engine/exhaust pipe	1
<b>Total</b>	<b>/1</b>

(b) What are **two** major symptoms experienced by aircrew suffering from CO poisoning?

Description	Marks
Any two of	
<ul style="list-style-type: none"> <li>• drowsiness</li> <li>• red face</li> <li>• headache</li> <li>• nausea</li> </ul>	1–2
<b>Total</b>	<b>/2</b>

(c) CO is extremely poisonous, because it attaches permanently to one component of the blood. Name the blood component affected by CO poisoning.

Description	Marks
Any of the following terms:	
<ul style="list-style-type: none"> <li>• red corpuscles/red blood cells/erythrocytes/haemoglobin</li> </ul>	1
<b>Total</b>	<b>/1</b>

13. Safety is the key issue in testing for alcohol and other drugs, including medical and illegal drugs.

(a) List **four** common effects of alcohol on the human body.

Description	Marks
Any four of:	
<ul style="list-style-type: none"> <li>• blurred vision</li> <li>• slurred speech</li> <li>• reduced hand-eye coordination</li> <li>• impaired balance</li> <li>• slowed reactions</li> <li>• nausea</li> <li>• fatigue</li> <li>• confusion</li> <li>• inability to concentrate</li> </ul>	1–4
<b>Total</b>	<b>/4</b>

(b) What is the minimum time between drinking alcohol and operating an aircraft?

Description	Marks
Eight hours	1
<b>Total</b>	<b>/1</b>

(c) Amphetamines are an illegal drug that, when used by some people, are known to make them overly aggressive, assertive and careless. Why would these traits be particularly bad for an airline pilot?

Description	Marks
<ul style="list-style-type: none"> <li>the crew must work closely together/these traits will prevent a team working effectively</li> <li>drugged member may intimidate other crew/be argumentative/domineering against other crew members</li> <li>drugged member may make impulsive/hasty decisions</li> </ul>	1–3
<b>Total</b>	<b>/3</b>

(d) State the purpose of a drug and alcohol response program.

Description	Marks
<ul style="list-style-type: none"> <li>anyone performing a 'safety sensitive aviation activity' (SSAA) under the influence of drugs and alcohol is prevented from performing those activities</li> </ul>	1
<ul style="list-style-type: none"> <li>unable to resume SSAA until it is deemed safe</li> </ul>	1
<b>Total</b>	<b>/2</b>

14. High gravitational loads can incapacitate a pilot through a loss of consciousness. This is referred to as g-force induced loss of consciousness (G-LOC).

(a) Explain why G-LOC occurs?

Description	Marks
Occurs during high g-forces/increasing positive g-forces	1
Blood in the body tends to move towards the feet	1
Reduction of blood flow to the brain results in starving the brain of oxygen	1
<b>Total</b>	<b>/3</b>

(b) Give **two** examples of circumstances during a flight in which G-LOC may occur.

Description	Marks
Any two of the following: <ul style="list-style-type: none"> <li>during high speed manoeuvres</li> <li>during recovery from a spin</li> <li>when encountering turbulence</li> <li>during aerobatic manoeuvres</li> <li>any other plausible manoeuvre</li> </ul>	1–2
<b>Total</b>	<b>/2</b>

(c) List **two** factors that increase a pilot's tolerance to high g-forces for short periods.

Description	Marks
Any two of the following: <ul style="list-style-type: none"> <li>• being physically fit</li> <li>• tensing stomach and leg muscles to prevent blood draining towards the feet</li> <li>• wearing a g-suit</li> <li>• semi-reclining seating (in high-performance aircraft)</li> <li>• special forced-breathing techniques</li> </ul>	1-2
<b>Total</b>	<b>/2</b>

(d) List **three** symptoms that may precede a loss of consciousness.

Description	Marks
A loss of colour vision/grey-out	1
Loss of peripheral vision/tunnel vision	1
A complete loss of vision but retaining consciousness	1
<b>Total</b>	<b>/3</b>

## Sample assessment task

### Aviation – General Year 12

#### Task 10 – Unit 4

**Assessment type:** Investigation – Helicopter design

#### Conditions

Period allowed for completion of the task: three weeks

Time will be allowed in class to plan and conduct the investigation. Parts of the investigation will be done in class under test conditions.

#### Task weighting

15% of the school mark for this pair of units

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#### Helicopter design

(58 marks)

In this task, you will investigate how a design feature affects the flight performance of a helicopter.

#### Part A: Research

(11 marks)

Research how a helicopter works and the types of movement it can make. Ensure that you have included the following:

- definition of lift
- how a helicopter achieves lift
- flight manoeuvres – vertical ascent and descent (autorotation).

You will be asked to complete a worksheet on this research in class, under test conditions. You will be given 20 minutes of class time to do this. Your teacher will collect this work as part of the assessment.

#### Part B: Planning

(17 marks)

Use the internet to find some paper helicopter designs. Working in a group, discuss what design feature you will test and how you will conduct your investigation. Consider the following:

- aim of your investigation
- hypothesis
- variables (independent, dependent and controlled variables)
- materials required
- procedure (include the number of trials you will do, how you will control variables)
- risk factors and how you will manage these.

You will be asked to complete a worksheet on the design of your investigation in class, under test conditions. You will be given 40 minutes of class time to do this. Your teacher will collect this work as part of the assessment.

#### Part C: Conducting your experiment

(6 marks)

Once your plan for investigating the design feature of your paper helicopter has been checked by the teacher, collect the equipment you need and, in your group, carry out the experimental work. Use the worksheet provided to record your results.

#### Part D: Data analysis and evaluation

(24 marks)

Use your results to complete Part D of the worksheet in class, under test conditions. You will be given one hour of class time to do this. This may be split over two lessons.

Name: \_\_\_\_\_

**Helicopter design**

**Part A: Research questions** (to be done in class, under test conditions) **(11 marks)**

Use your research to answer the following questions:

1. In order to fly, an object must have 'lift'. Explain what is meant by lift. **(2 marks)**

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2. Explain how lift is achieved in a helicopter. **(5 marks)**

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3. Define autorotation and explain how it contributes to the safe landing of a helicopter in the event of a complete engine failure. **(4 marks)**

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**Submit Part A to your teacher for marking.**

**Part B: Planning** (to be done in class, under test conditions)**(17 marks)**

Select the design feature that you are going to test using the paper helicopters, e.g. paper type, rotor length, leg length, leg width, number of paper clips.

4. State the aim of the investigation. (1 mark)

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5. Write an hypothesis for the investigation. (2 marks)

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6. State the independent variable (i.e. variable to be changed) in the investigation. (1 mark)

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7. State the dependent variable (i.e. variable to be measured) in the investigation. (1 mark)

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8. Name **three** variables which need to be controlled in the investigation. (3 marks)

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**Part C: Conducting the investigation** (to be done in your group)**(6 marks)**

Ensure that you conduct your investigation in an orderly and safe way.

11. Present your results in a table. (If you choose to use a spreadsheet for recording data, printouts of these sheets should be attached.) **(6 marks)**

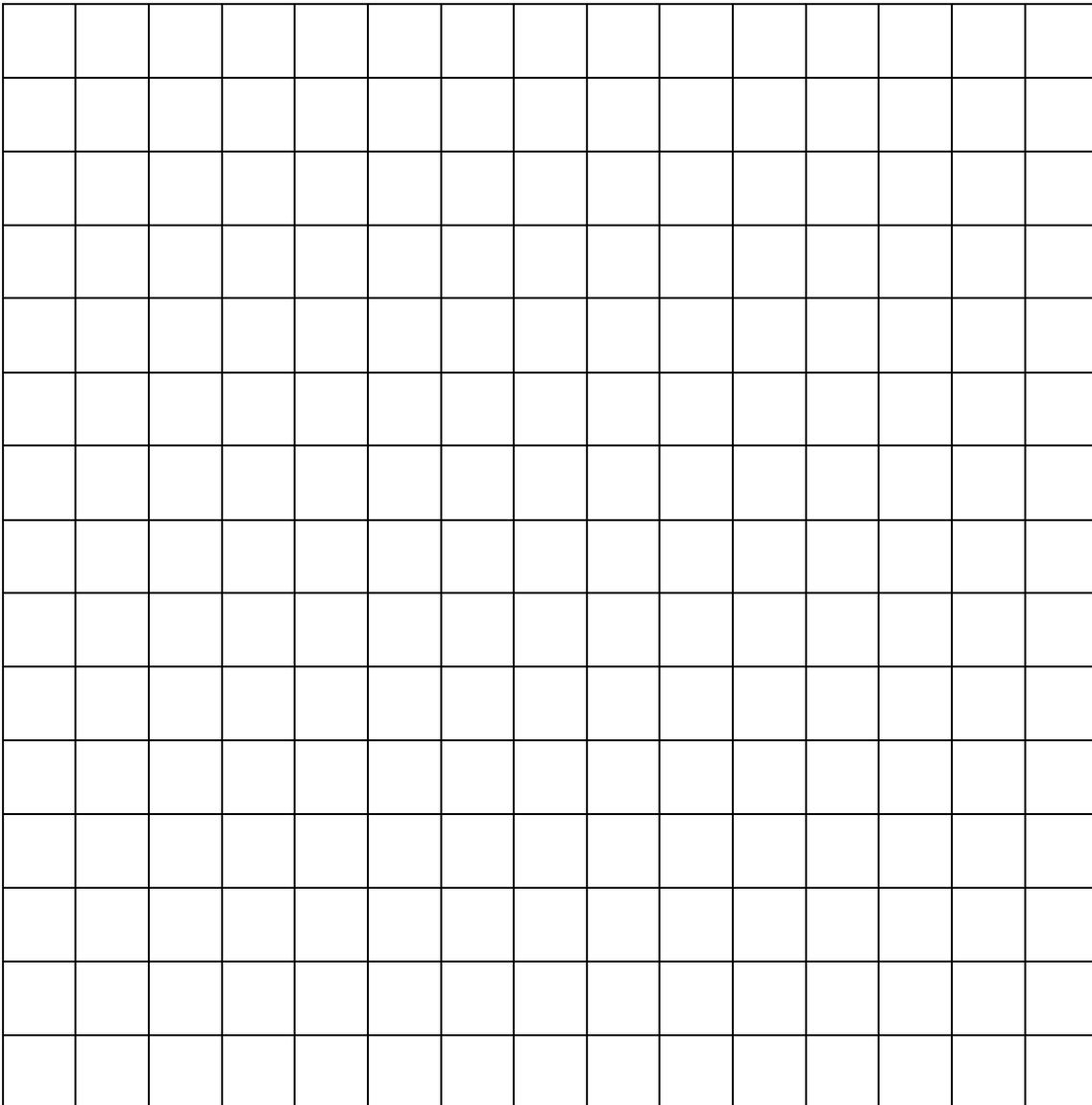
**Part D: Data analysis and evaluation** (to be done in class, under test conditions)**(24 marks)**

12. Draw a graph of your data. (You can either use the grid below or attach a separate graph.)

(6 marks)

- Remember to plot the independent variable on the horizontal axis.
- Remember that the title of the graph should mention both the independent and dependent variables.

Title: \_\_\_\_\_





16. Describe the main sources of experimental error (number of trials, measurement error, poor control of variables). (3 marks)

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17. How confident are you with your conclusions? How much uncertainty/error is associated with your data? (3 marks)

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18. Describe **two** ways in which your investigation could be improved. (4 marks)

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### ACKNOWLEDGEMENTS

#### Helicopter design

Concept from: Hackling, M. W. (2005). *Working scientifically: Implementing and assessing open investigation work in science* (Rev. ed.) (Appendices 2 & 3: Planning and report worksheet for science investigations). Perth: Department of Education and Training, pp. 27–38.

## Marking key for sample assessment task 10 – Unit 4

### Helicopter design

#### Part A: Research questions

1. In order to fly, an object must have 'lift'. Explain what is meant by lift.

Description	Marks
Defines lift as a force	1
Explains where the lift is generated	1
<b>Total</b>	<b>/2</b>

2. Explain how lift is achieved in a helicopter.

Description	Marks
Describes the shape of the rotor blade	1
Describes the effect that shape has on air flow	1
Describes the effect of air flow speed on the rotor blade	1
Describes how a helicopter moves air over its rotor blades	1
Describes how the helicopter achieves lift off	1
<b>Total</b>	<b>/5</b>
<b>Answer could include, but is not limited to:</b>	
Rotor blades have a curved shape on top and are flatter on the bottom	
Air flows faster over the top than under the bottom	
Faster air flow over the top of the blade causes the blade to lift	
Helicopter rotor blades spin to move the air over the blades	
The rotor makes the lift that carries the helicopter up	

3. Define autorotation and explain how it contributes to the safe landing of a helicopter in the event of a complete engine failure.

Description	Marks
Autorotation is where the upward movement of air through the rotor causes the rotor system to turn, not the power of the engine	1
When the engine fails: <ul style="list-style-type: none"> <li>pilot will lower the collective pitch, reducing lift and drag</li> <li>the helicopter begins to descend, producing an upward flow of air through the rotor system</li> <li>the upward flow of air through the rotor provides sufficient thrust to maintain rotor rpm throughout the descent</li> </ul>	1–3
<b>Total</b>	<b>/4</b>

**Part B: Planning**

Select the design feature that you are going to test using the paper helicopters, e.g. paper type, rotor length, leg length, leg width, number of paper clips.

4. State the aim of the investigation.

Description	Marks
States the aim of the investigation	1
<b>Total</b>	<b>/1</b>

5. Write an hypothesis for the investigation.

Description	Marks
States a testable prediction about the direction of interaction between variables	1
Includes the independent variable and dependent variable, or states two separate hypotheses	1
<b>Total</b>	<b>/2</b>

6. State the independent variable (i.e. variable to be changed) in the investigation.

Description	Marks
States the independent variable (i.e. variable to be changed) in the investigation	1
<b>Total</b>	<b>/1</b>
<b>Answer could include, but is not limited to:</b>	
Paper type, rotor length, leg length, leg width, number of paper clips	

7. State the dependent variable (i.e. variable to be measured) in the investigation.

Description	Marks
States the dependent variable (i.e. variable to be measured) in the investigation	1
<b>Total</b>	<b>/1</b>
<b>Answer could include, but is not limited to:</b>	
Flight time/time taken for the helicopter to reach the floor	

8. Name **three** variables which need to be controlled in the investigation.

Description	Marks
Names three relevant variables that need to be controlled	1–3
<b>Total</b>	<b>/3</b>
<b>Answer could include, but is not limited to:</b>	
<ul style="list-style-type: none"> <li>• height from which the helicopters are dropped</li> <li>• drop point for each trial (variations in physical conditions will affect flight time)</li> <li>• conditions under which the trials are conducted (on different days, there may be more wind, humidity)</li> <li>• how the helicopters are held and released</li> <li>• same person releasing all the helicopters</li> <li>• same person making all the helicopters</li> <li>• same scissors and ruler used to measure and cut helicopters</li> <li>• source of paper</li> </ul>	

9. Plan the procedure. How you will assess the design features that you have chosen to investigate. You will need to consider how variables will be controlled.

Description	Marks
Tests two design features	1
Recognises that a better design is one that has a longer flight time	1
Uses a distance that takes longer than 10 seconds to reduce timing errors	1
Uses repeat trials to get an average time	1
Describes how variables identified in the planning phase will be controlled	1
<b>Total</b>	<b>/5</b>

10. List **two** risk factors in conducting your investigation and describe any precautions required.

Description	Marks
Dropping helicopters from a height may pose a risk factor (from a ladder/top of stairs/chair) Suggests an appropriate precaution	1–2
Safety risk to passers-by who may walk beneath the drop zone Suggests an appropriate precaution, e.g. cordon off an area for the drop zone	1–2
<b>Total</b>	<b>/4</b>

### Part C: Conducting the investigation

Ensure that you conduct your investigation in an orderly and safe way.

11. Present your results in a table. (If you choose to use a spreadsheet for recording data, printouts of these sheets should be attached.)

Description	Marks
Columns clearly labelled	1
Units included in headings	1
Places the independent variable in the left-hand column and the dependent variable in the right-hand column	1
Records at least three trials for each variation of the design feature being tested	1
Calculates the average for each variation of the design feature being tested	1–2
<b>Total</b>	<b>/6</b>

### Part D: Data analysis and evaluation

12. Draw a graph of your data. (You can either use the grid below or attach a separate graph.)
- Remember to plot the independent variable on the horizontal axis.
  - Remember that the title of the graph should mention both the independent and dependent variables.

Description	Marks
Uses appropriate type of graph	1
Constructs graph with correct axes	1
Labels axes correctly, including units	1
Graphs the average (not each trial) of each variation of the design feature	1
Plots graph accurately	1
Uses an appropriate title that includes the independent variables and the dependent variables	1
<b>Total</b>	<b>/6</b>

13. Describe any patterns, trends or relationships that you observe in your data.

Description	Marks
States the patterns, trends or relationships in the data	1
Provides supporting information	1
<b>Total</b>	<b>/2</b>

14. Using science concepts, explain the patterns, trends or relationships you have identified in your data.

Description	Marks
Describes forces acting on the helicopter <ul style="list-style-type: none"> <li>gravity</li> <li>air resistance (upward and inward forces)</li> </ul>	
Explains patterns, trends or relationships identified in the data using relevant science concepts (one of the following, with an explanation) <ul style="list-style-type: none"> <li>more paperclips/longer legs/wider legs/heavier paper – increased mass and greater force due to gravity results in reduced flight time</li> <li>larger blades/longer rotors – greater surface area resisting air pressure results in increased flight time</li> </ul>	1–2
<b>Total</b>	<b>/4</b>

15. Write a conclusion that links your hypothesis and your findings.

Description	Marks
Makes a valid statement relating the hypothesis to the results	1
Provides evidence to support this statement	1
<b>Total</b>	<b>/2</b>

16. Describe the main sources of experimental error (number of trials, measurement error, poor control of variables).

Description	Marks
Describes relevant sources of error in the experimental design <ul style="list-style-type: none"> <li>number of trials</li> <li>measurement error</li> <li>control of variables</li> </ul>	1–3
<b>Total</b>	<b>/3</b>

17. How confident are you with your conclusions? How much uncertainty/error is associated with your data?

Description	Marks
States level of confidence with the data	1
Provides supporting evidence	1–2
<b>Total</b>	<b>/3</b>

18. Describe **two** ways in which your investigation could be improved.

Description	Marks
Describes two ways in which the investigation could be improved, e.g. number of trials, way in which measurements are made, controlling variables (2 marks each)	1–4
<b>Total</b>	<b>/4</b>