Directions
Do not open this testpaper or start writing until the supervisor directs you to do so.

1 Time allowed: 2 hours
2 Perusal time: 10 minutes
3 Equipment:

<table>
<thead>
<tr>
<th>Permitted</th>
<th>Not permitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>pens (black ink)</td>
<td>own paper</td>
</tr>
<tr>
<td>pencils</td>
<td>dictionary</td>
</tr>
<tr>
<td>eraser</td>
<td>thesaurus</td>
</tr>
<tr>
<td>ruler</td>
<td>electronic devices</td>
</tr>
<tr>
<td>protractor</td>
<td>transparent container</td>
</tr>
<tr>
<td>drawing compass</td>
<td>other approved items</td>
</tr>
<tr>
<td>coloured pencils</td>
<td></td>
</tr>
</tbody>
</table>

You are not permitted to borrow or lend equipment.

4 This testpaper has 17 items, numbered 1 to 17.
5 The 17 items are arranged within 10 units.
6 You may attempt the units in any order.
7 Write your responses in the spaces provided.
8 Write in sentences unless you are instructed to respond in a different manner.
9 Use black ink for written responses.
10 Sufficient space is provided for an appropriate response to each item. However, if you need more space to complete, rewrite or redraft a response, use the spare pages at the back of this testpaper. Be sure to:
   • label the spare page with the item number that relates to your response
   • cancel your incorrect response by ruling a single, diagonal line through your work; if you fail to do this, your original response will be marked
   • refer the marker to the appropriate page at the back.
11 Points to observe:
   • Pay particular attention to any instruction block (cue) in an item.
   • An item and star-value distribution is given as a fold-out on the back page. Use this to help you manage your time.
   • Respond to as many items as you can. Give your best attempt rather than leave a blank space; items left blank attract no credit.
   • Be vigilant about covering your responses.
12 You will be given a warning 30 minutes before finishing time.
   You will be given a final warning 10 minutes before finishing time.
UNIT ONE

To assist with the identification of an aircraft from a distance, drawings of the aircraft's outlines and distinguishing features from three different perspectives are used. Below is a photograph of the Fokker F27 Friendship and drawings of it.
ITEM 1 [**]

Identify each of the aircraft below from the drawings of various aircraft on the opposite page.

Write the name of the aircraft beside its photograph.
GO STRAIGHT ON ...
UNIT TWO

A word square consists of a group of different words, all equal in length, arranged in a square grid to form the same words when read across as down.

Word squares evolved to become a puzzle in which a word in the grid matches the particular clue provided for it. Figure 1 gives four clues and shows the four words matching them arranged in a $4 \times 4$ grid. Proper names, abbreviations and acronyms are not used in a word square.

**Clues:**

1. discover

2. an original thought

3. subsequent

4. found on a calendar

**Figure 1**

ITEM 2 [**]

Complete a $3 \times 3$ word square in the grid below by giving a word that matches the first clue and then writing two other different words. Devise an appropriate clue for each of the other words you use in the word square.

**Clues:**

1. an animal often kept as a pet

2. ..............................................................

3. ..............................................................

Use correct spelling.
Remember proper names, abbreviations and acronyms cannot be used.
UNIT THREE

The most-played code of football in the world is often referred to as soccer in Australia to differentiate it from the other football codes played here.

A leather soccer ball starts life as a set of regular pentagons and regular hexagons laid out flat in the pattern shown in Figure 1.

![Figure 1](image)

The pieces from Figure 1 are stitched together to form a truncated icosahedron or more simply an uninflated soccer ball (shown in Figure 2).

The length of each seam that joins two pieces together is 4.5 cm.

![Figure 2](image)

When the truncated icosahedron is inflated it becomes a spherical soccer ball (Figure 3).

This soccer ball has a circumference of 69 cm.

![Figure 3](image)
ITEM 3 [***]

Given $\ell$ is the length of a side:

- the area of a regular pentagon can be approximated by $1.72\ell^2$ and
- the area of a regular hexagon can be approximated by $2.60\ell^2$.

Calculate the surface area of the ball in its **uninflated** state, i.e. as a truncated icosahedron.

Show all steps.

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ITEM 4 [***]

Determine, to the nearest whole square centimetre, the surface area of the **inflated** soccer ball shown in Figure 3.

**Reminder:** For a sphere of radius $r$, the circumference $= 2\pi r$ and the surface area $= 4\pi r^2$.

Show all steps.
UNIT FOUR

The following adapted extract focuses on a pawnbroker’s shop in 19th century London. A pawnbroker’s shop was a place where people could surrender an item of their personal property for money. They were given a set period of time to buy back the item but after that time, the item was owned by the pawnbroker and could be sold (usually at a profit).

What a place of broken promises and lost hopes the pawnbroker’s shop proved to be! Every class, every profession, every walk of life was represented in its grubby windows, the detritus\(^1\) of so many lives pinned like butterflies behind the glass. Overhead, a wooden sign hung on rusty chains, refusing to swing in the breeze as if to assert that nothing here would ever move, that once the owners had lost their possessions, they would never see them again. Garnet brooches and silver watches, china cups and vases, pen holders, teaspoons and books, fought for space on the shelves with such disparate objects as a clockwork soldier and a stuffed jay\(^2\). A whole army of chessmen stood guard over a battlefield of rings and bracelets laid out on green baize\(^3\). What workman had sacrificed his chisels and saws for beer and sausages at the weekend? What little girl managed without her Sunday dress while her parents struggled to find food for the table? The window was not just a display of human degradation. It was a celebration.

Notes:  
\(^1\) debris, remnants  
\(^2\) a type of bird  
\(^3\) felt-like fabric

ITEM 5 [\*]

Personification, a literary technique in which an object is represented in human terms, is used in this description of a pawnbroker’s shop.

Cite two examples of personification from the extract.

Example 1

Example 2
ITEM 6 [****]

The author of the extract has sought to elicit an emotional response from readers. Identify an emotional response a reader might have and explain how the various techniques and the language employed in the extract evoke this response.

Refer to specific examples to support your explanation.

Don't overlook the effect of the last two sentences.
UNIT FIVE

Bushwalkers and hikers need a means of predicting with some accuracy how much time it will take to walk the length of an unfamiliar track. In 1892 a Scottish mountaineer named William Naismith devised a rule of thumb for this purpose. He assumed that the walker was used to hiking and that the weather was fair.

His basic rule is as follows:

allow 1 hour for every 3 miles along the track, plus 1 hour for every 2000 feet of ascent.

The metric version of Naismith’s rule is:

allow 1 hour for every 5 km along the track, plus 1 hour for every 600 m of ascent.

ITEM 7 [***]

Given that one mile is equal to 5280 feet and one foot is equivalent to 30.48 cm, confirm that the metric version is a reasonable approximation to Naismith’s rule.

Show all calculations.

ITEM 8 [***]

There is a 6.1 km walking track to the top of Cradle Mountain in Tasmania. It starts at Ronny Creek which is 900 m above sea level and goes via Kitchen Hut to finish on top of Cradle Mountain, 1545 m above sea level.

Using the metric version of Naismith’s rule, predict the time it should take to hike from Ronny Creek to the top of Cradle Mountain. Assume the walkers are used to hiking and that the weather is fair.

Show all steps.

Round your answer to the nearest ten minutes.
Phillip Tranter, another Scottish hiker, used Naismith’s rule and then factored in the various levels of fitness of hikers to produce revised walking time estimates. Tranter’s table shown below gives times predicted using Naismith’s rule and the corresponding revised times that cater for the different fitness levels of hikers.

<table>
<thead>
<tr>
<th>Level of fitness</th>
<th>Time taken in hours (predicted using Naismith’s rule)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>exceptionally fit</td>
<td>1</td>
</tr>
<tr>
<td>very fit</td>
<td>1¼</td>
</tr>
<tr>
<td>fit</td>
<td>1½</td>
</tr>
<tr>
<td>average</td>
<td>2</td>
</tr>
<tr>
<td>unfit</td>
<td>2¼</td>
</tr>
<tr>
<td>very unfit</td>
<td>3¼</td>
</tr>
</tbody>
</table>

Tranter’s table

A travel guide uses the information in Tranter’s table when advising about walking times for available hikes. For a 12-km hike that according to Naismith’s rule should take 3 hours and 40 minutes the guide recommends that hikers allow 5½ hours.

Use Tranter’s table to determine the fitness level of hikers on which the travel guide has based its recommendation for this hike.

Clearly present your reasoning referring to values from the table.
UNIT SIX

In some educational institutions it is common practice to sit long pencil and paper exams. The student in the extract below has strong views about how to approach these examinations.

She paced exams like a marathon. In a three hour examination, she finished her initial responses within a strictly self-enforced two hours. For twenty minutes, she returned to uncomfortable questions she had indicated with a lightly pencilled star. After reworking her response, she erased the star because she didn’t believe in changing an answer more than once. For another twenty minutes, she focused on the crucial phrasing of the questions, ensuring that her answers corresponded. She was vigilant that a four-mark question receive no more than four indisputably correct facts in the answer; it was possible to lose credit by including incorrect extra information. She sat straight, with her ankles crossed under her seat.

ITEM 10 [***]

Infographics are visual representations that accurately and concisely display information. An effective infographic enables quick and meaningful interpretation by a viewer.

Using the space below, present an infographic that displays how the student in the extract uses her time in a three hour exam. Your infographic should have a title, be drawn to scale and use minimal text.
ITEM 11 [***]

Choose two of the exam-sitting strategies the student employs. Discuss, for each strategy, how the use of it might:

- improve her exam result
- be detrimental to her exam result.

Strategy 1

Strategy 2
UNIT SEVEN

This unit is about virtues — admirable character traits — some of which were recognised by the Greek philosopher Aristotle.

Aristotle argued that any virtuous behaviour is an intermediate state between its corresponding but opposing vices of deficiency and excess. For example, when you are talking about your own abilities, the virtuous behaviour is honesty. The vice of deficiency in this context is false modesty, which means to talk down your abilities. The vice of excess is boastfulness, that is, exaggerating your abilities.

Listed in the table below are some virtues with their corresponding vices of deficiency and excess.

<table>
<thead>
<tr>
<th>Vice of deficiency</th>
<th>Virtue</th>
<th>Vice of excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>false modesty</td>
<td>honesty</td>
<td>boastfulness</td>
</tr>
<tr>
<td>cowardice</td>
<td>courage</td>
<td>recklessness</td>
</tr>
<tr>
<td>cantankerousness</td>
<td>good-naturedness</td>
<td>subservience</td>
</tr>
<tr>
<td>stinginess</td>
<td>generosity</td>
<td>extravagance</td>
</tr>
</tbody>
</table>

ITEM 12 [**]

For each of the following words below, provide a synonym that could act as a substitute for that word as it is used in the table.

Responses formed by attaching prefixes or suffixes to words in the table will gain no credit.

- courage: ........................................................
- cantankerousness: ..............................................
- extravagance: ...................................................
ITEM 13 [***]

I. The virtue, trust, would lie between its vices, gullibility and suspiciousness. Write each of these vices in its correct position in the top row of the table below.

II. The following nine words include three more virtues, each with corresponding vices of deficiency and excess. Write the nine words in the appropriate positions in the table below.

respect, indulgence, inflexibility, confidence, servility,

meekness, tolerance, belligerence, impertinence

<table>
<thead>
<tr>
<th>Vice of deficiency</th>
<th>Virtue</th>
<th>Vice of excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>trust</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
UNIT EIGHT

A monument was constructed in the ancient mythical city of Beltane. Documents showing the names of the days (daies) of the week (weke) and the relationship between the units of time used in Beltane were found and are shown below.

<table>
<thead>
<tr>
<th>Daies of the Weke:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luan</td>
</tr>
<tr>
<td>Mairt</td>
</tr>
<tr>
<td>Ciadain</td>
</tr>
<tr>
<td>Ardaoin</td>
</tr>
<tr>
<td>Haoine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Units of Time: Thides, Niads, Daies</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 thides - 1 niad</td>
</tr>
<tr>
<td>18 niads - 1 daie</td>
</tr>
<tr>
<td>5 daies - 1 weke</td>
</tr>
</tbody>
</table>

The following specifications relate to the construction of the monument:

- Entire monument consisting of 42,000 blocks was constructed by a gang of six workers.
- On average, each worker laid 135 blocks per niad.
- A working daie was half a normal daie and each worker took rest periods totalling 16 thides each working daie.
- The first full working daie was the first daie of the weke, Luan, and no-one worked on the sacred daie of Haoine.
ITEM 14 [****]

Determine on which date of which week the monument was completed.

Show all steps.  
Clearly state what is being calculated at each step.
UNIT NINE

Two different translations of a poem by Russian poet, Anna Akhmatova, are shown below.

Translation 1

Three things enchanted him:
white peacocks, evensong¹,
and faded maps of America.
He couldn't stand bawling brats,
or raspberry jam with his tea,
or womanish hysteria.
... And he was tied to me.

Note: ¹prayer sung in the evening

Translation 2

He loved these three things
White peacocks, evening songs,
And worn-out maps of America.
No crying of children,
No raspberry tea,
No women's hysterics...
I was married to him.

ITEM 15 [****]

Explore how the different tones of the translations are established and how they influence your perceptions of the two people and their relationship.

Refer to examples of similarity and difference.
GO STRAIGHT ON ...
UNIT TEN

Fire ants, an introduced pest, were first detected in Queensland in 2001. Because the spread of these ants poses a serious social and environmental threat an eradication program was established.

The program uses bait made up of a mixture of corn and soy bean (to attract the ants) and an active ingredient. The active ingredient, depending on which is used, can either kill the ants that ingest it or disrupt their life cycle.

Helicopters are used to broadcast the bait over large areas to achieve the coverage required for effective eradication. The coverage is generally given in kilograms of bait per hectare.

ITEM 16 [***]

A storage bin that is attached to the underside of a small helicopter carries 150 kilograms of bait. For the active ingredient being considered, the coverage of bait required for effective eradication is 2 kilograms per hectare. The bait contains, by mass, five parts of active ingredient for every thousand parts of bait.

Reminder: 1 hectare = 10000 square metres

I. What is the maximum area in hectares that can be baited from a single flight?

II. Calculate, in grams per square metre, how much of the active ingredient would be applied at the coverage specified.
Advice: Scan the information on this page, read Item 17 then return to the information with the item in mind.

An experiment was conducted to trial the use of the active ingredients X and Y in fire ant baits. Separate same-sized plots of land were baited with one of each of the active ingredients. The experiment included a control, C, where the 'bait' used contained no active ingredient. The number of nests per plot was recorded for 24 weeks following the baiting. The graph below shows results from the experiment.

In an ideal situation an active ingredient would target only the selected pest, leaving any non-target species and the environment unharmed. Factors that have to be considered when assessing the risks to non-target species and the environment include:

- amount of active ingredient introduced into the environment by the baiting program
- toxicity as indicated by the oral LD<sub>50</sub>. Oral LD<sub>50</sub> of an active ingredient is the amount that has to be ingested by non-target animals (per kilogram of their body weight) to kill 50% of them
- half-life of an active ingredient once on the ground. Half-life of an active ingredient is how long it takes an amount of it to break down (become harmless) to half that amount.

The table below shows, for the active ingredients X and Y, information related to the risk factors for non-target species and the environment.

<table>
<thead>
<tr>
<th>active ingredient</th>
<th>active ingredient applied (grams per hectare)</th>
<th>oral LD&lt;sub&gt;50&lt;/sub&gt; (grams ingested)</th>
<th>half-life on the ground (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X — disrupts the life cycle of fire ants</td>
<td>5.6</td>
<td>more than 34.6</td>
<td>10</td>
</tr>
<tr>
<td>Y — kills fire ants that ingest it</td>
<td>0.76</td>
<td>1.73</td>
<td>43</td>
</tr>
</tbody>
</table>
ITEM 17 [****]

Discuss, for each of the active ingredients X and Y, the effectiveness of, and the possible risks involved with, its use in a fire ant eradication program.

Refer to data from the graph and the table.

You may use point form.
a The House of Silk, published by The Orion Publishing
's Aircraft Recognition Guide, published by
of an Anna Akhmatova poem from
ervative Extension, for adapted data and graph from
1 and Volume 4, published by Eaglemoss Publications
rdietting and Miraculous Cures, published by Anchor
la Limited, 2005.

* to trace the ownership of copyright enabling us to rectify any error or
tions is welcome.

Item and star-value distribution
The star-value rates a specific item relative to others in the paper in
terms of worth/effort.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Item</th>
<th>Star-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONE</td>
<td>1</td>
<td>**</td>
</tr>
<tr>
<td>TWO</td>
<td>2</td>
<td>**</td>
</tr>
<tr>
<td>THREE</td>
<td>3</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>***</td>
</tr>
<tr>
<td>FOUR</td>
<td>5</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>****</td>
</tr>
<tr>
<td>FIVE</td>
<td>7</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>***</td>
</tr>
<tr>
<td>SIX</td>
<td>10</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>***</td>
</tr>
<tr>
<td>SEVEN</td>
<td>12</td>
<td>**</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>***</td>
</tr>
<tr>
<td>EIGHT</td>
<td>14</td>
<td>****</td>
</tr>
<tr>
<td>NINE</td>
<td>15</td>
<td>****</td>
</tr>
<tr>
<td>TEN</td>
<td>16</td>
<td>***</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>****</td>
</tr>
</tbody>
</table>

For planning purposes, it may be useful to know that there are 50
stars in total, with the middle stars occurring at Item 10.