

2015 VCE VET Engineering Studies examination report

General comments

Students struggled with engineering sketches and drawings in the 2015 examination. Basics such as drawing centre lines correctly and drawing correct views using third-angle projection were generally completed poorly.

Most students seemed to have a good grasp of 5S and its application in industry.

Overall, a good understanding of safety was displayed by most students

Specific information

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding resulting in a total more or less than 100 per cent.

Section A – Multiple-choice questions

The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D	% No Answer
1	93	6	1	0	0
2	15	41	17	26	0
3	24	13	13	51	0
4	20	75	1	4	0
5	0	1	1	97	0
6	3	3	91	4	0
7	6	15	68	11	0
8	61	18	7	13	0
9	4	3	10	83	0
10	0	53	29	17	0
11	14	1	7	78	0
12	5	20	72	2	0
13	90	1	1	7	0
14	23	74	1	2	0
15	3	1	2	95	0
16	3	6	34	57	0
17	88	7	3	3	0
18	7	11	65	17	0
19	17	72	7	5	0
20	45	44	8	2	1

Section B

Question 1a.

Marks	0	1	Average
%	39	61	0.6

56 mm

Question 1b.

Marks	0	1	Average
%	64	36	0.4

Boring bar (reamer was also accepted)

Most students seemed unfamiliar with a boring bar, which is a common lathe tool.

Question 1c.

Marks	0	1	Average
%	65	35	0.4

Remove galvanising by grinder or file.

The key to this question was recognising that the pipe was galvanized. Some students either missed this point or did not realise the relevance.

Question 1d.

Marks	0	1	2	Average
%	68	8	24	0.6

Weld in a well-ventilated area because of fumes.

Question 2

Marks	0	1	2	Average
%	7	34	58	1.5

Description of hazard	Action
Electrical hazard – possible electric shock	1. switch off power
	2. remove and send for repair – or discard

Question 3a.

Marks	0	1	Average
%	7	93	

PPE is anything used/worn by a person to minimise the risk to that person's health and safety.

Question 3b.

Marks	0	1	2	Average
%	1	3	96	

A range of answers was accepted, with the type of PPE and reason required; for example:

Example of PPE	Used when and why?
safety boots	used when there is a risk of a heavy object falling on feet
face masks	<ul style="list-style-type: none"> • when particles and projectiles are present • for face protection

Question 4

Marks	0	1	2	3	4	Average
%	13	7	32	8	40	

The following were the most common correct responses, but other answers were accepted if they were applicable.

Safety concern	Management
swarf flying into eyes	safety glasses
drill grabbing and job rotating	use engineering vice or clamp for job

Question 5a.

Marks	0	1	Average
%	33	67	

Engine hoist (floor crane or similar was also accepted)

Question 5b.

Marks	0	1	Average
%	10	90	

Primarily to lift engines out of cars

Other answers were also accepted, such as lift heavy items into position.

Question 5c.

Marks	0	1	2	Average
%	37	21	42	1.1

Weight closer to fulcrum

Answers demonstrating knowledge of leverage/mechanical advantage were also accepted.

Question 6

Marks	0	1	2	Average
%	16	19	65	1.5

Relevant 5S stage	Action
Standardise or sustain	raise a recommendation to change the location of the tool

Question 7a.

Marks	0	1	2	3	4	5	Average
%	3	3	8	25	3	57	4

5S activity	5S stage
general cleaning and painting of the work area	Shine
items classified according to essential and non-essential tools	Sort
best location for each tool identified based on frequency of use	Set
monthly audit of the work area implemented to ensure compliance with standards	Sustain
all personnel in the workshop briefed on the company's standard operating procedures	Standardise

Question 7b.

Marks	0	1	2	Average
%	9	26	66	1.6

A variety of answers was accepted, including:

- less time spent searching for items/tools
- less clutter/safer work area
- more space
- better work environment.

Question 8a.

Marks	0	1	2	3	Average
%	13	27	28	32	1.8

5S step	Area of improvement
Sort	Essential items should be placed in the work area where they can be accessed easily.
Set	Move screwdriver or purchase a new one for the workshop.
Standardise	<ul style="list-style-type: none"> • Discuss/enforce tools being returned to a location at the end of each day. • Ensure maintenance logbooks are updated regularly

Question 8b.

Marks	0	1	Average
%	41	59	0.6

Sustain

Question 9a.

Marks	0	1	2	Average
%	19	34	46	1.3

A variety of answers was accepted, including:

- ensure all activities are completed
- all tools are accounted for
- ensure area is maintained
- pick up any damaged or missing equipment early.

Question 9b.

Marks	0	1	Average
%	23	77	

Standardise (sustain was also accepted)

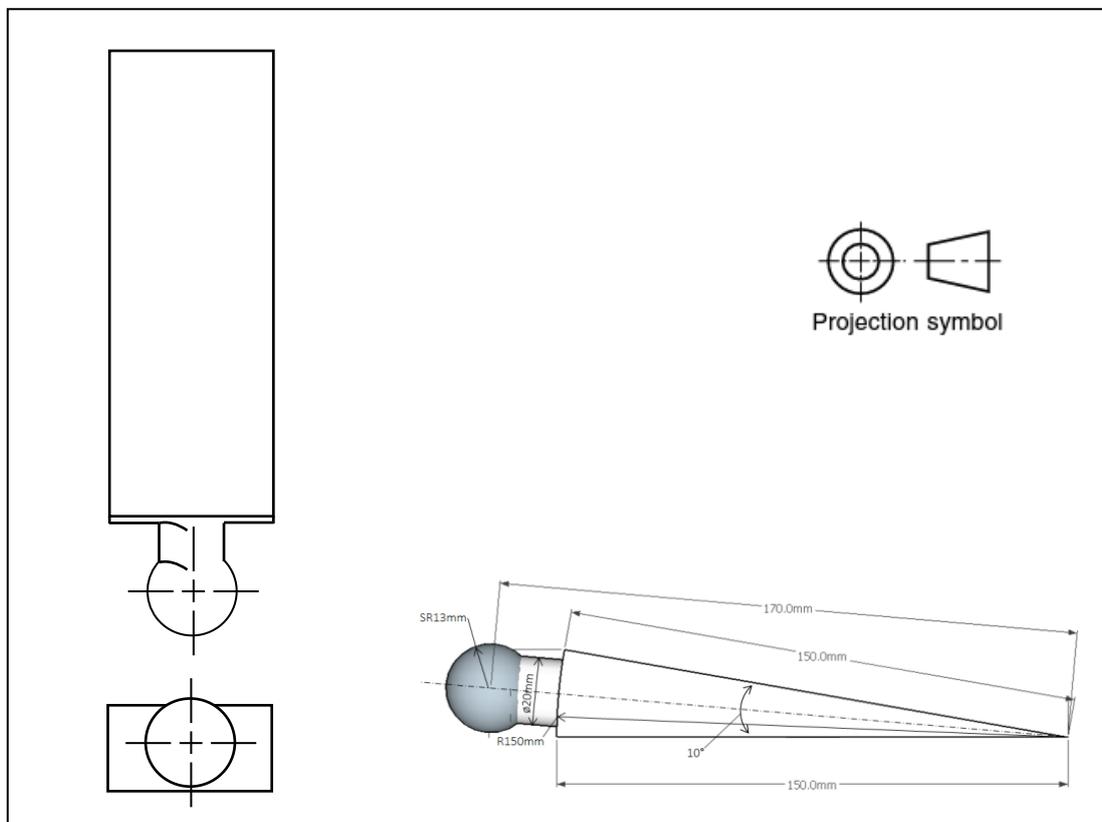
Question 10

Marks	0	1	2	Average
%	43	33	24	

5S step	How waste reduction is achieved
Sort	<ul style="list-style-type: none"> • create more space, improve work flow • reduce inventory
Set	<ul style="list-style-type: none"> • spend less time searching for things • reduce motion and transport waste

Question 11a.

Marks	0	1	2	3	4	5	Average
%	13	12	18	15	14	28	



Question 11b.

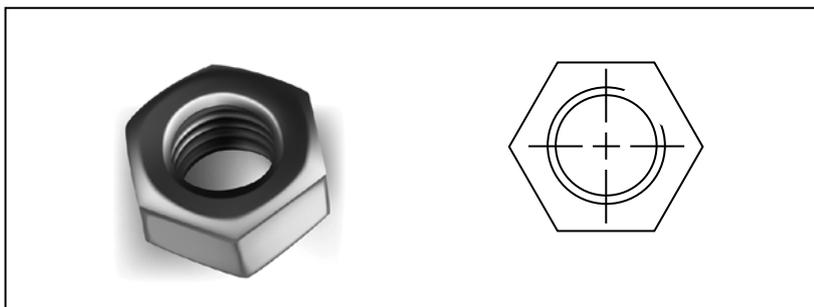
Marks	0	1	2	Average
%	36	9	56	1.2

Typical responses accepted included:

- use wood instead of brass, reduce slip
- attach rubber to faces to prevent slipping.

Question 12

Marks	0	1	2	3	4	Average
%	75	14	8	2	1	0.4



Question 13a.

Marks	0	1	Average
%	12	88	0.9

5 mm

Question 13b.

Marks	0	1	Average
%	50	50	0.5

9.98 mm–10.02 mm

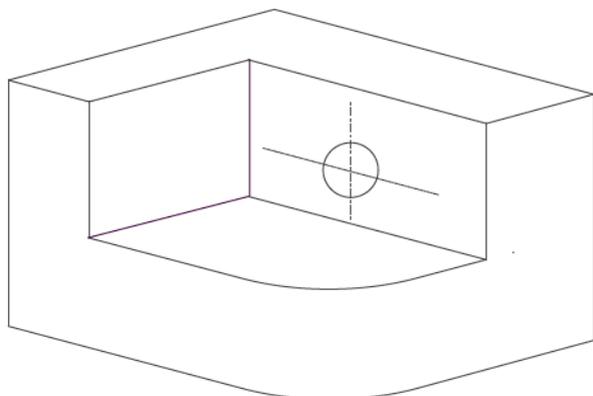
Question 13c.

Marks	0	1	2	Average
%	56	11	33	0.8

To lock the component to the shaft (or similar)

Question 14

Marks	0	1	2	3	4	Average
%	26	13	9	13	40	2.3



Question 15

Marks	0	1	2	3	Average
%	23	22	21	34	1.7

$$\begin{aligned}
 V &= L \times W \times H \\
 &= 1.4 \times 1.15 \times 0.93 \\
 &= 1.4973 \text{ m}^3 \\
 &= 1.50 \text{ m}^3
 \end{aligned}$$

Question 16

Marks	0	1	2	Average
%	17	23	60	1.5

Both men with bent knees on either side of the trolley, team lift instructions used

Question 17a.

Marks	0	1	Average
%	69	31	0.3

Metals that contain iron

Question 17b.

Marks	0	1	2	Average
%	40	24	36	1

Brass, copper, lead, aluminium, etc.

Question 17c.

Marks	0	1	Average
%	69	31	0.3

Use a magnet to check.

Question 17d.

Marks	0	1	2	Average
%	57	18	25	0.7

Early separation makes it much easier to recycle (reduces time needed to sort out) and company receives maximum money for scrap.

Question 18

Marks	0	1	2	3	4	5	6	7	8	Average
%	12	9	12	19	19	15	8	4	4	3.4

Sustainability recommendation	Rank	Explanation
Rework the steel off-cuts instead of sending them to scrap metal waste and utilise directly in another part of the production process.	1	What was previously going to waste is now being used. This saves new materials from being used, so there are benefits in costs and to the environment.
Install solar panels on the building's roof to supplement the peak electricity used (coal-fired). On a sunny day, the solar panels could meet half of the office's requirements.	2	Saves power from coal-fired supply, significant capital costs to install and provides up to 50% of office power requirements.
Use off-peak, night-rate electricity (coal-fired) rather than peak, day-rate electricity (coal-fired) to power the induction furnaces.	3	Could be cost effective if the staff are willing to work at night; however, saving could be taken up with staff penalty rates. However, no actual power consumption is reduced, so no reduction of greenhouse gases.
Treat and then re-use the manufacturing wastewater in an ornamental fountain and pond at the front of the office.	4	Purely ornamental, requires energy to treat the water and electric power to run the pumps. Has very little effect on sustainability.

Question 19a.

Marks	0	1	2	3	Average
%	58	12	7	23	1

$$V = (L \times W \times H)/2$$

$$V = (1.4 \times 0.45 \times 1.15)/2$$

$$V = 0.36 \text{ m}^3$$

Question 19b.

Marks	0	1	Average
%	45	55	0.6

No it would not

Question 19c.

Marks	0	1	2	Average
%	42	27	31	0.9

2 tonnes = 2000 kg

$$[(2000 \times \$ 0.11) - \$35 \text{ (collection fee)}]$$

$$= \$220.00 - \$35.00 = \$185.00$$