

B O A R D O F S T U D I E S
NEW SOUTH WALES

2013

**HIGHER SCHOOL CERTIFICATE
EXAMINATION**

Metal and Engineering

General Instructions

- Reading time – 5 minutes
- Working time – 2 hours
- Write using black or blue pen
Black pen is preferred
- Board-approved calculators may be used
- Write your Centre Number and Student Number at the top of pages 9, 11, and 15

Total marks – 80

Section I Pages 2–6

15 marks

- Attempt Questions 1–15
- Allow about 20 minutes for this section

Section II Pages 9–17

35 marks

- Attempt Questions 16–19
- Allow about 50 minutes for this section

Section III Page 19

15 marks

- Attempt Question 20
- Allow about 25 minutes for this section

Section IV Page 20

15 marks

- Attempt Question 21
- Allow about 25 minutes for this section

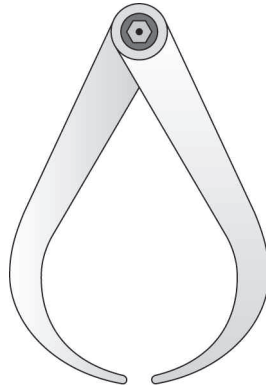
Section I

15 marks

Attempt Questions 1–15

Allow about 20 minutes for this section

Use the multiple-choice answer sheet for Questions 1–15.

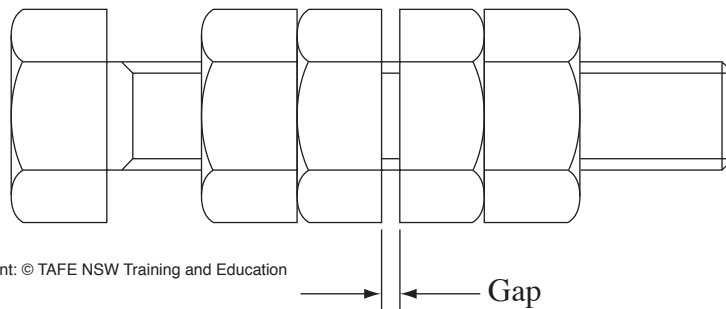


Acknowledgement: © TAFE NSW Training and Education

What is the name of the tool shown above?

- (A) Inside calipers
- (B) Spring dividers
- (C) Outside calipers
- (D) Bowleg calipers

2 The assembly shown requires a gap of 0.2 mm.



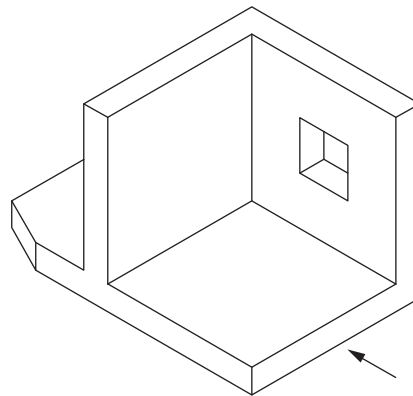
Acknowledgement: © TAFE NSW Training and Education

Which is the most appropriate gauge to use to set this gap?

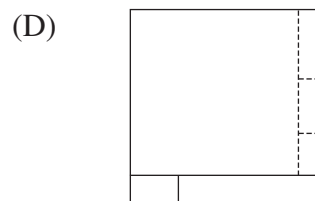
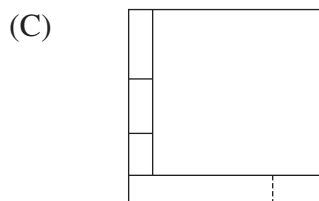
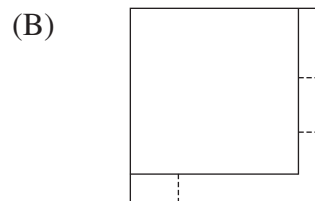
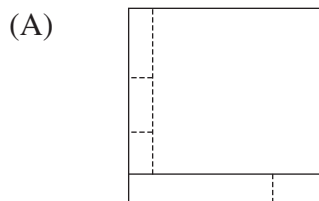
- (A) Dial
- (B) Feeler
- (C) Marking
- (D) Screw pitch

- 3** What should be done first when changing the abrasive disc on an angle grinder?
- (A) Isolate the power.
 - (B) Remove the guard.
 - (C) Loosen the locking nut.
 - (D) Check the rotation direction.
- 4** A burr has developed on an external screw thread.
- Which tool would be the most effective to repair the damage?
- (A) Die nut
 - (B) Die stock
 - (C) Button die
 - (D) Divided disc die
- 5** Which of the following is defined as 'a permissible variation of a dimension'?
- (A) Limits
 - (B) Nominal
 - (C) Scale
 - (D) Tolerance
- 6** What does the saw kerf produced by a hacksaw blade prevent?
- (A) Binding
 - (B) Clogging
 - (C) Stripping of the teeth
 - (D) Breaking of the blade

7 This object is to be viewed from the direction of the arrow.

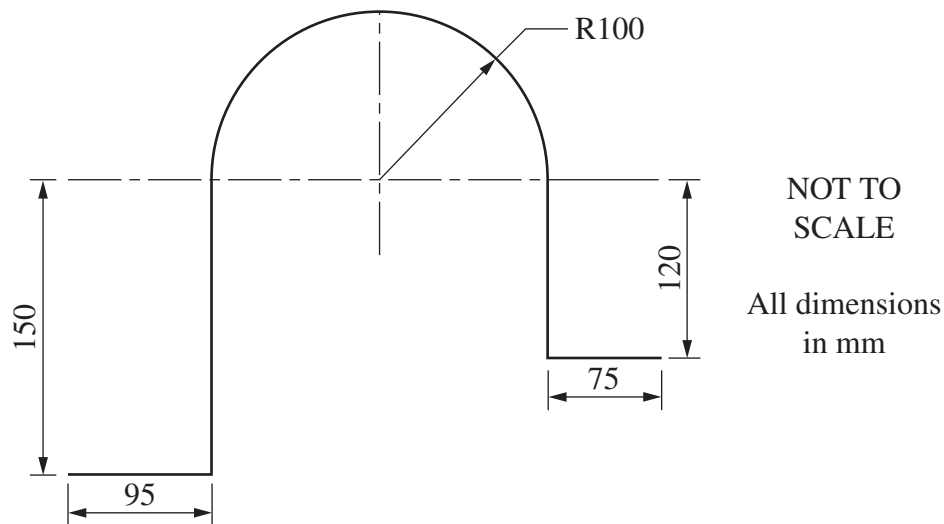


Which of the following shows the correct view?



8 Which of the following refers to the likelihood of a workplace injury occurring?

- (A) Accident
- (B) Incident
- (C) Hazard
- (D) Risk

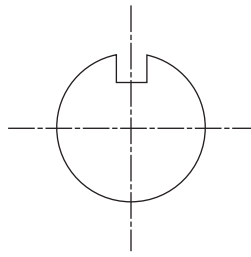


What is the minimum length of material required to produce the bracket shown from 0.5 mm sheet metal?

(Note: The formula for the circumference of a circle is $2\pi r$ or πD .)

- (A) 540
 - (B) 640
 - (C) 755
 - (D) 1068
- 10** Which type of error occurs when measuring tools are not placed at right angles to the work?
- (A) Alignment
 - (B) Calibration
 - (C) Parallax
 - (D) Reading
- 11** Which quality control process would minimise variation in mass produced items?
- (A) Routine updating of skills
 - (B) Regular sampling of product
 - (C) Periodic inspection of machinery
 - (D) Efficient marking out of materials

- 12** The keyway slot shown in the diagram is to be machined to a depth of 5 ± 0.1 mm.



Which measuring device can be used to accurately determine this measurement?

- (A) Centre square
 - (B) Engineers rule
 - (C) Vernier calipers
 - (D) Inside micrometer
- 13** Which of the following is a role of a workplace safety committee?
- (A) To investigate accidents
 - (B) To issue fines to workers
 - (C) To maintain plant machinery
 - (D) To recommend training for workers
- 14** What type of skill is demonstrated when employees show respect and tolerance towards each other?
- (A) Communication
 - (B) Interpersonal
 - (C) Organisational
 - (D) Personal
- 15** In relation to manufacturing, which of the following is an external customer?
- (A) The product distributor
 - (B) The quality control supervisor
 - (C) The person who orders the product
 - (D) The person responsible for the next stage of production

BLANK PAGE

BLANK PAGE



Metal and Engineering

--	--	--	--	--

Centre Number

Section II

35 marks

Attempt Questions 16–19

Allow about 50 minutes for this section

--	--	--	--	--	--	--	--	--

Student Number

Detach the page at the end of the paper and use Drawing 2013–1, CLAMP ASSEMBLY, to answer Questions 16–17.

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

Question 16 (9 marks)

- (a) Identify the type of symbol located at A1. **1**



.....

.....

- (b) Determine the length that each CSK SCREW (ITEM 3) will protrude through the BASE PLATE (ITEM 1) when fully assembled. Show all working. **2**

.....

.....

.....

.....

Question 16 continues on page 10

Question 16 (continued)

- (c) Two LOCATING SCREWS (ITEM 4) are used to locate the CLAMPING PLATE (ITEM 6) to the BASE PLATE (ITEM 1). 2

What quality assurance checks need to be made to ensure ITEMS 1 and 6 can be assembled?

.....
.....
.....
.....

- (d) Name TWO drawing types in the CLAMP ASSEMBLY drawing and outline their purpose. 4

.....
.....
.....
.....
.....
.....
.....
.....
.....

End of Question 16



2013 HIGHER SCHOOL CERTIFICATE EXAMINATION

Metal and Engineering

--	--	--	--	--

Centre Number

Section II (continued)

--	--	--	--	--	--	--	--	--

Student Number

Question 17 (9 marks)

Please turn over

Question 17 (9 marks)

- (a) The BASE PLATE (ITEM 1) is to be manufactured from a precut piece of mild steel $100 \times 75 \times 6$. **6**

Complete the table by proposing a sequence of steps for both marking out and manufacturing the BASE PLATE and listing the tools required to complete each task.

<i>Sequence of steps – marking out</i>	<i>Tools</i>
<i>Sequence of steps – manufacturing</i>	<i>Tools</i>

Question 17 continues on page 13

Question 17 (continued)

- (b) A cutting fluid should be used during the drilling of the component parts of the CLAMP ASSEMBLY. **3**

Explain why it is important to consult a material safety data sheet (MSDS) for the cutting fluid when undertaking this task.

.....

.....

.....

.....

.....

.....

End of Question 17

BLANK PAGE

--	--	--	--	--

Centre Number

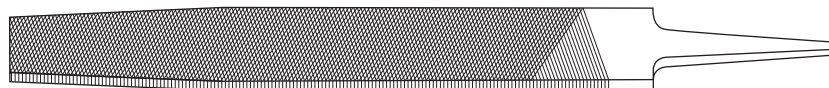
Section II (continued)

--	--	--	--	--	--	--	--	--	--

Student Number

Question 18 (8 marks)

- (a) Name the file pictured. 1



Acknowledgement: © PCS Publications

.....

- (b) Outline the process of cross filing. 2

.....
.....
.....
.....

- (c) Explain TWO features of a file that should be considered when selecting a file for a given application. 2

.....
.....
.....
.....

- (d) Describe how files should be cared for and maintained during and after use. 3

.....
.....
.....
.....
.....
.....

Question 19 (9 marks)

- (a) Name the feature labelled Z on the portable electric hand drill shown and outline its purpose.

2



Acknowledgement: Robert Bosch Australia Pty Ltd

.....

.....

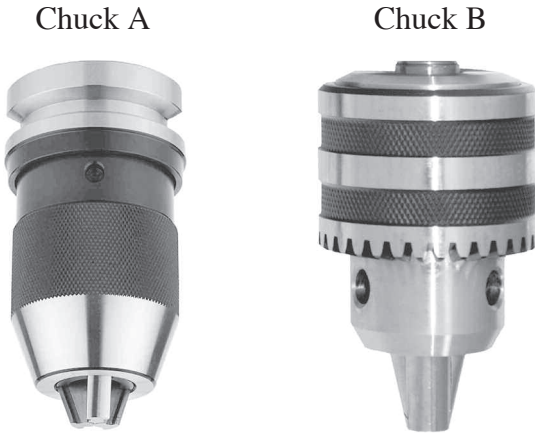
.....

.....

Question 19 continues on page 17

Question 19 (continued)

(b) Outline an advantage of using EACH of the drill chucks shown. 2



Acknowledgement: © Grizzly Industrial, Inc

.....

.....

.....

.....

(c) A portable electric hand drill is to be used to drill a hole in metal. 5

Compare the use of a standard operating procedure (SOP) to that of a safe work method statement (SWMS) when undertaking this routine task.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

End of Question 19

BLANK PAGE

Metal and Engineering

Section III

15 marks

Attempt Question 20

Allow about 25 minutes for this section

Answer the question in a writing booklet. Extra writing booklets are available.

In your answer you will be assessed on how well you:

- demonstrate knowledge and understanding relevant to the question
 - communicate ideas and information using relevant workplace examples and industry terminology
 - present a logical and cohesive response
-

Question 20 (15 marks)

Workers may experience problems such as bullying, harassment or unfair access to opportunities.

Describe the roles that governments, organisations, employers, supervisors and employees have in preventing and overcoming these problems.

Please turn over

Section IV

15 marks

Attempt Question 21

Allow about 25 minutes for this section

Answer the question in a SEPARATE writing booklet. Extra writing booklets are available.

Question 21 (15 marks)

A team of workers has been assigned to take delivery of 60 lengths of various sections of mild steel. Each length of mild steel is 6 metres long. The task requires the team to manually unload the steel from a truck and carry it into the workshop for safe storage.

- (a) Outline some possible causes of manual handling injuries which could occur while carrying out this task. **3**
- (b) A risk assessment has been conducted for this task. What steps should now be followed to help control the possible risks of injuries to the workers? **4**
- (c) Describe a safe and efficient storage system for both full lengths and cut lengths of these mild steel sections, and how such a system would benefit the organisation. **8**

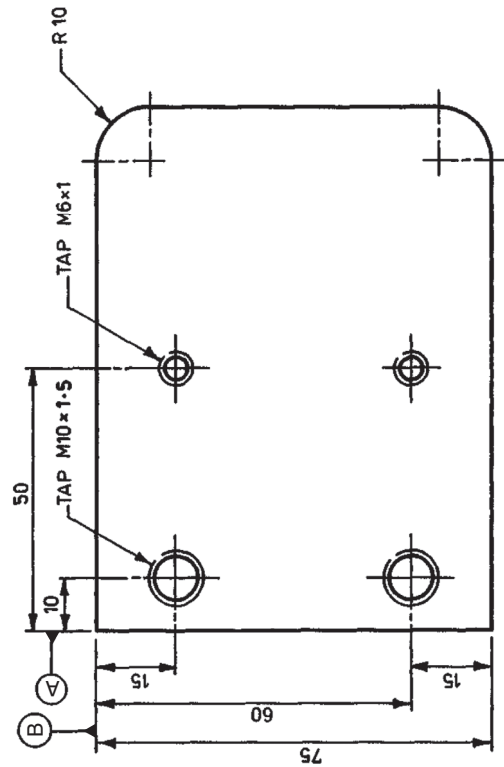
End of paper

2013 HIGHER SCHOOL CERTIFICATE EXAMINATION

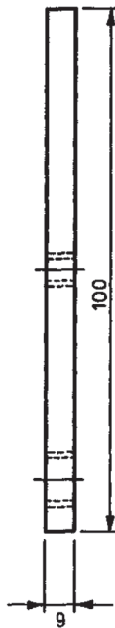
Metal and Engineering

Detach this sheet and use Drawing 2013–1 to answer Questions 16–17.

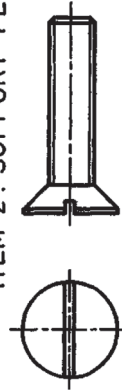
Please turn over



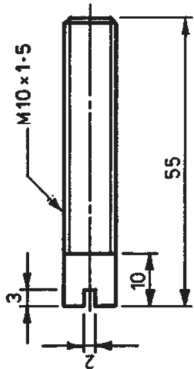
ITEM 1: BASE PLATE



ITEM 2: SUPPORT PLATE



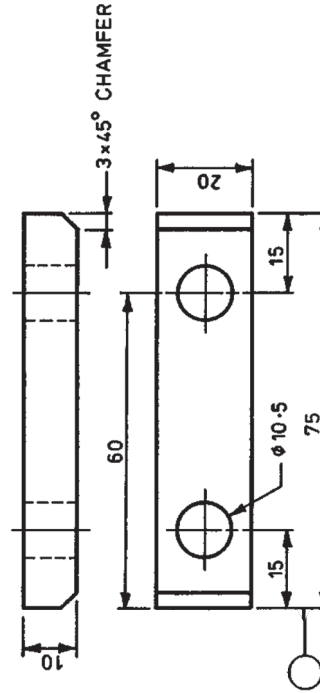
ITEM 3: CSK SCREW
M6 x 1 x 25
(2 OFF)



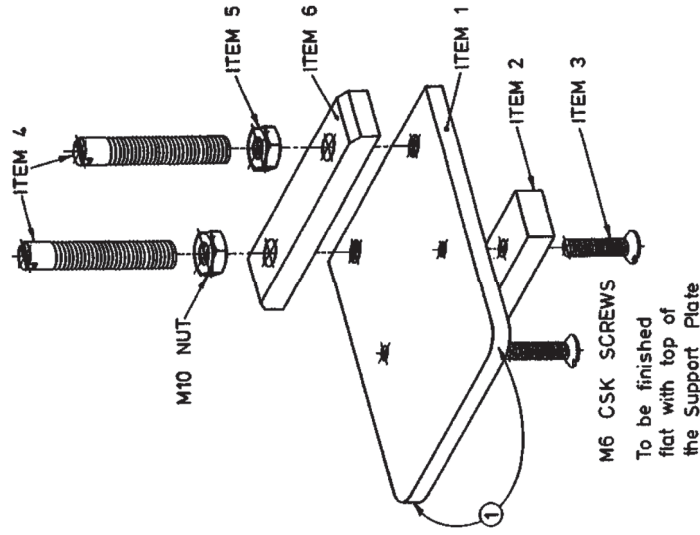
ITEM 4: LOCATING SCREW
(2 OFF)



ITEM 5: LOCK NUT
M10 x 1.5
(2 OFF)



ITEM 6: CLAMPING PLATE



M6 CSK SCREWS
To be finished flat with top of the Support Plate

ITEM	Description	Qty
ITEM 6	20 mm x 10 mm BMS	1
ITEM 5	NUTS M10 x 1.5	2
ITEM 4	Ø 10 mm BMS	2
ITEM 3	CSK SCREWS M6 x 1 x 25	2
ITEM 2	20 mm x 10 mm BMS	1
ITEM 1	75 mm x 6 mm BMS	1
Material	Description	Qty

BOARD OF STUDIES

TITLE

CLAMP ASSEMBLY

FINISHES		RECORD OF ISSUE	
ALL CUT SURFACES TO BE FILED flat, smooth and deburred unless otherwise noted.			
① BRIGHT	Drawfiled and polished	A	B

SCALE	SIZE	DRWG No	SHT
NTS	A4	2013-1	1