higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – BOILER MAKING
NQF LEVEL 3

(6031013)

21 November 2018 (X-Paper)
09:00–12:00

This question paper consists of 12 pages.

NCV

TIME: 3 HOURS
MARKS: 150

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. Read ALL the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Write neatly and legibly.

NCV

QUESTION 1

1.1 Draw a neat drawing of the following welding joint, indicating the welding symbol, weld symbol and weld position:

Butt joint – V-groove weld – other side of joint (3 × 1) (3)

1.2 FIGURE 1 shows the floorplan of a workshop.

Calculate the total area of the floor by using the diagonal length in the Pythagoras theorem.

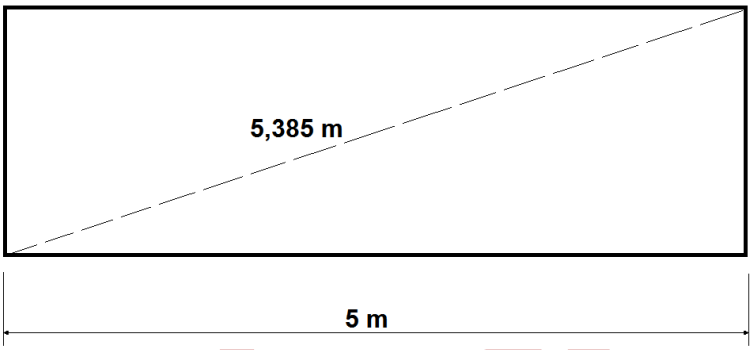
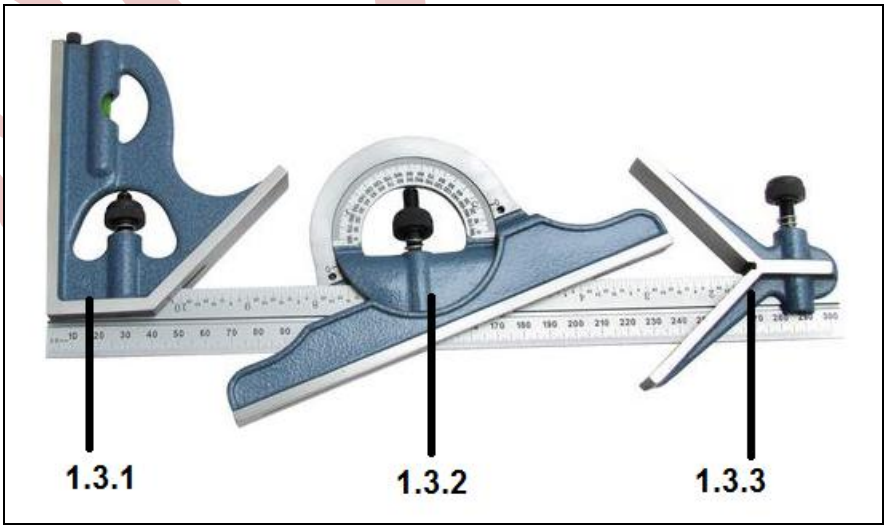


FIGURE 1

(6 × 1) (6)

1.3 FIGURE 2 shows a combination set. Each component can be used for certain purposes in conjunction with the ruler to accomplish certain tasks.

Give ONE use of each labelled component by writing the answer next to the question number (**1.3.1–1.3.3**) in the ANSWER BOOK.



[Source: *www.bing.com/combination set*]

FIGURE 2 (3)

1.4 Give ONE reason why an engineering ruler is marked from the edge. (1)

1.5 Explain why the hook on a measuring tape is loose (has play). (1)

1.6 FIGURE 3 shows a certain measuring process using a measuring tape.

Explain the purpose of this measuring process.

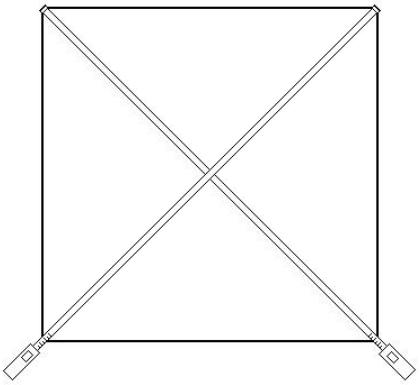


FIGURE 3 (2)

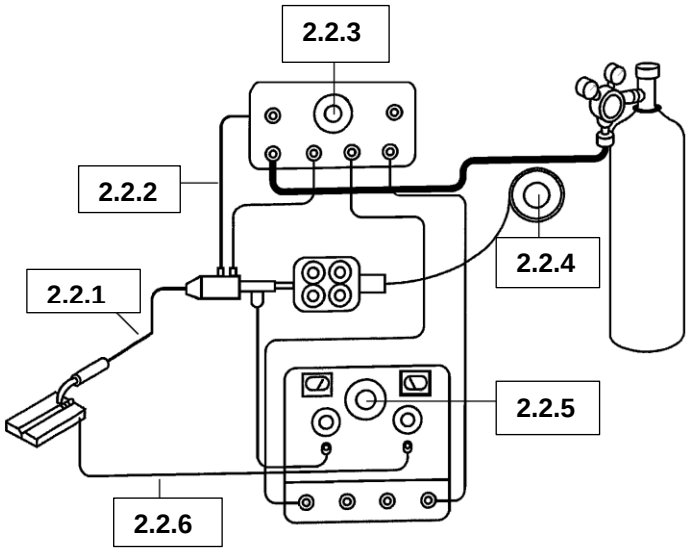
1.7 State THREE things to consider when selecting measuring and checking tools. (3)

1.8 State ONE advantage of using a jig. (1)
[20]

QUESTION 2

2.1 Name any THREE documents that you need before planning a project. (3)

2.2 Identify the components of the GMAW system in FIGURE 4 by writing only the answer next to the question number (2.2.1–2.2.6) in the ANSWER BOOK.



[Adapted from: *Eng. Fab L3 Pearson,* 2008]

FIGURE 4 (6)

2.3 Make neat drawings to illustrate each of the following welding joints:

2.3.1 Single J-groove – butt joint

2.3.2 Outside corner – single V-groove – corner joint

2.3.3 Single bevel – edge joint

(3 × 2) (6)

2.4 Distinguish between the *rod slope angle* of a butt joint and a lap joint when doing GMAW. (2)

2.5 List FOUR effects gases have on a weld. (4)

2.6 Make neat drawings of the following welding defects and clearly indicate the defects:

2.6.1 Undercutting on a butt joint

2.6.2 Poor fusion on a butt joint

(2 × 2) (4)

2.7 Extension leads are widely used to do on-site welding.

Explain the THREE negative effects resulting in safety hazards or a totally damaged extension lead if the lead is not rolled off completely before welding commences. (3)

2.8 Name the classification of each of the following metal compositions:

2.8.1 Metals mainly consisting of iron

2.8.2 Metals containing little or no iron

(2 × 1) (2)

[30]

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QUESTION 3

3.1 FIGURE 5 shows a round tank fabricated from 10 mm hot-rolled sheet. The tank is sealed with a top lid and a bottom base.

Calculate the volume of the tank in m^3. Show ALL calculations. Calculations must be rounded off to three decimals.

NOTE: The measurements indicated are outside measurements.

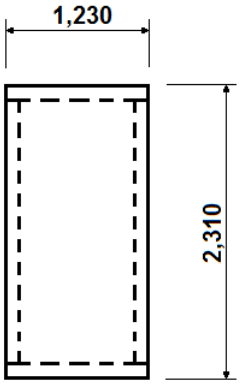


FIGURE 5 (5)

3.2 FIGURE 6.1 shows a pipe opening indicating the mean circumference. FIGURE 6.2 shows a pipe opening indicating the outside circumference.

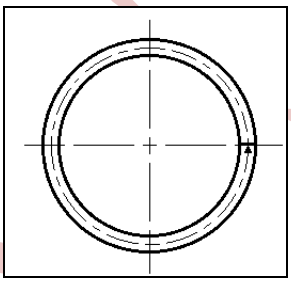


FIGURE 6.1

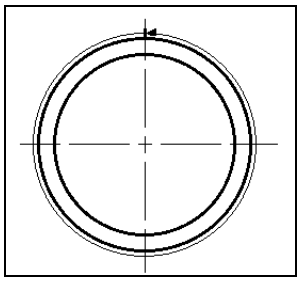


FIGURE 6.2

Compare the TWO sketches and identify which circumference must be used to develop the pipe. Write only FIGURE 6.1 or FIGURE 6.2 next to the question number (3.2) in the ANSWER BOOK. (1)

3.3 State THREE things a crane driver should not do while operating a crane. (3)

3.4 List THREE factors to consider when selecting lifting equipment. (3)

3.5 List THREE safety precautions to which you should adhere when feeding a plate into rolls. (3)

3.6 State THREE accidents caused by poor housekeeping in a workshop. (3)

3.7 List THREE types of dished ends used on pressure vessels. (3)

3.8 Choose a description from COLUMN B to rectify the welding irregularity in COLUMN A. Write only the letter (A–C) next to the question number (3.8.1–3.8.2) in the ANSWER BOOK.

COLUMN A (IRREGULARITY)		**COLUMN B (RECTIFICATION)**	
3.8.1	Porosity	A	clean surface and reweld with new electrode
3.8.2	Cracks	B	clean surface and reweld. use low hydrogen welding process, increasing shielding gas flow, using electrodes with basic slagging reactions
		C	remove any previous weld bead on surface

(2 × 2) (4)

[25]

QUESTION 4

4.1 FIGURE 7 shows a bracket manufactured from 50 mm × 50 mm × 5 mm angle iron.

Calculate the total length of angle iron needed to manufacture the bracket.

NOTE: The corners are 90° and do NOT have radii. Use the indicated letters to assist you with identification of parts.

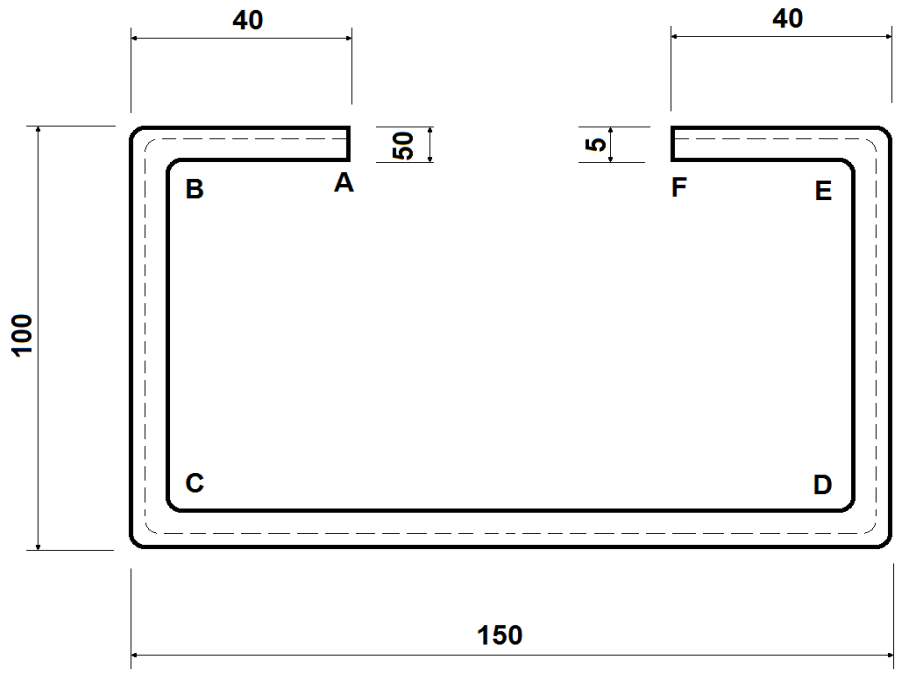


FIGURE 7 (6)

4.2 Study the square-to-round truncated cone in FIGURE 8 to determine whether FIGURE 8.1 or FIGURE 8.2 represents the correct development of FIGURE 8. Write only FIGURE 8.1 or FIGURE 8.2 next to the question number (4.2) in the ANSWER BOOK.

Take note of seam x-x.

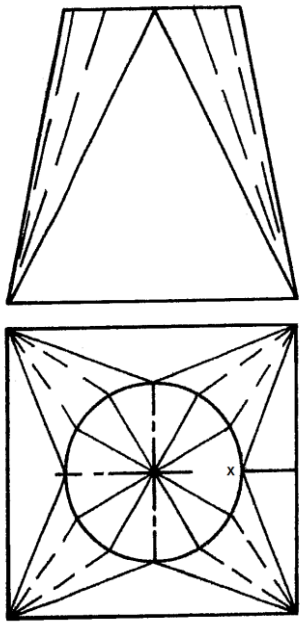


FIGURE 8

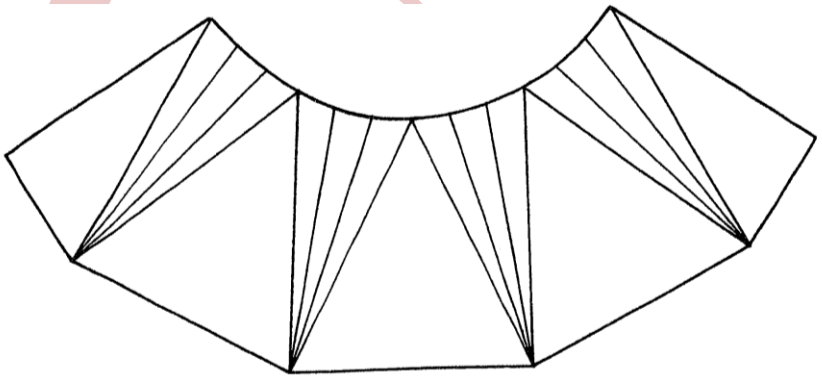


FIGURE 8.1

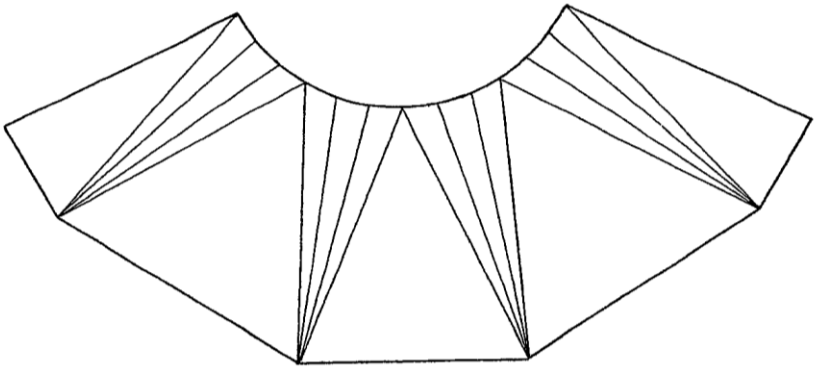


FIGURE 8.2 (2)

4.3 Study the rectangle-to-square truncated hopper in FIGURE 9 to determine whether FIGURE 9.1 or FIGURE 9.2 represents the correct development of FIGURE 9. Write only FIGURE 9.1 or FIGURE 9.2 next to the question number (4.3) in the ANSWER BOOK.

NOTE: Take note of seam x-x.

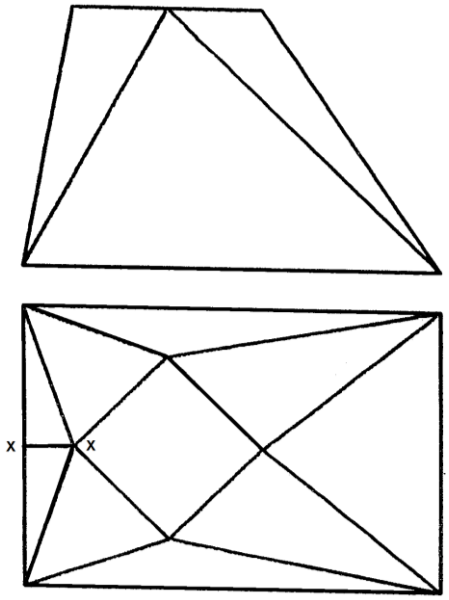


FIGURE 9

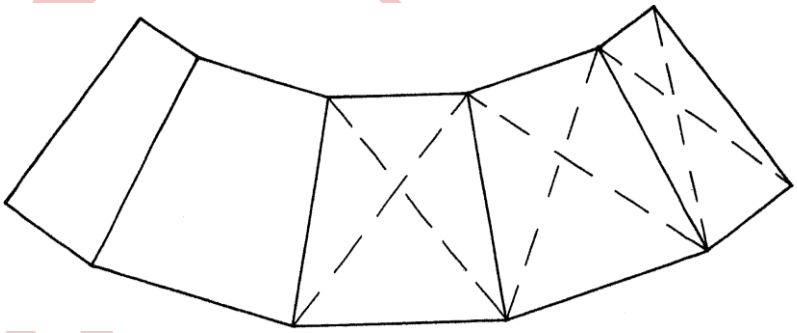


FIGURE 9.1

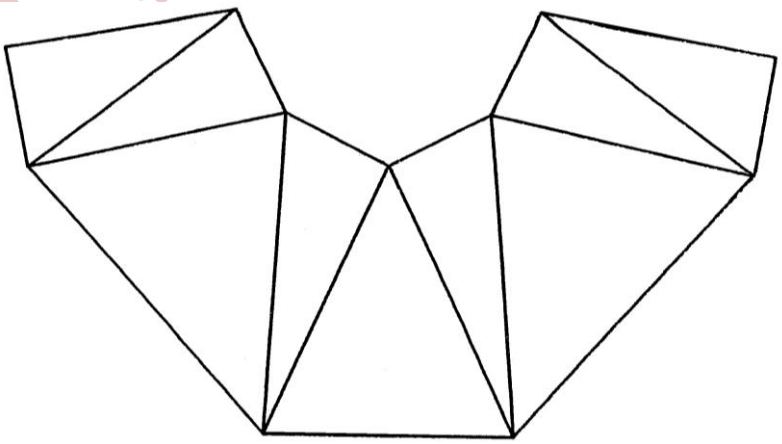


FIGURE 9.2 (2)

4.4 Redraw the front and top views of the square cone shown in FIGURE 10 to scale 1:1 in the ANSWER BOOK. Construct the scale to determine the true length of corner line OA.

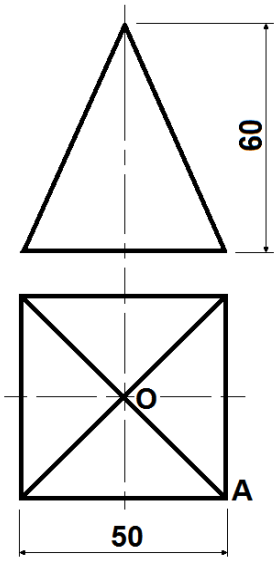
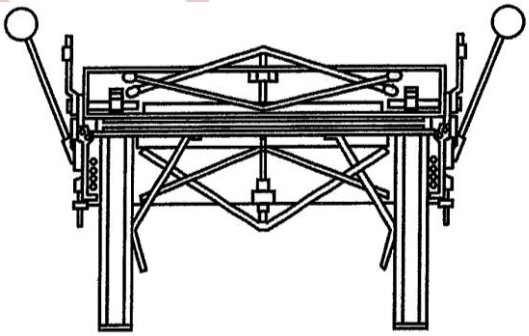


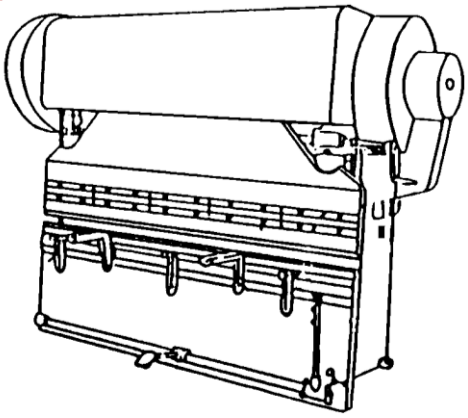
FIGURE 10 (4)

4.5 Identify the two machines used in a fabrication workshop by writing the answer next to FIGURE 11.1–FIGURE 11.2 in the ANSWER BOOK.



[Adapted from: *Eng. Fab L3 Pearson,* 2008] (2)

FIGURE 11.1



[Adapted from: *Plater's Theory N2*]

FIGURE 11.2

4.6 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (4.6.1–4.6.2 in the ANSWER BOOK.

4.6.1 A 5 mm thick plate can be bent on a press brake machine to an inside radius of 3 mm.

4.6.2 The bar folding machine can only bend plates thinner than 0,7 mm.

(2 × 1) (2)

4.7 State THREE steps to remember when using the bar folding machine. (3)

4.8 State THREE methods of developing surface patterns. (3)

4.9 Name the process explained below regarding the cleaning process when welding must be done.

'It is the removal of surface oxides from metals by means of electrochemical reactions'. (1)

[25]

TOTAL: 100

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