higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

ENGINEERING DRAWING N2

(8090272)

16 April 2020 (X-paper)
09:00–13:00

This question paper consists of 11 pages.

280Q1A2016

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
ENGINEERING DRAWING N2
TIME: 4 HOURS
MARKS: 100

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. Make all drawings neatly with drawing instruments unless otherwise specified.
5. Use your own drawing instruments.
6. Do all drawing and written work in pencil. Use a black or blue pen for candidate information.
7. Use both sides of the DRAWING SHEET.
8. Draw a 15 mm border on both sides of the DRAWING SHEET.
9. Unspecified radii must be R3.
10. All drawings must conform to the latest SANS 10111 Code of Practice for Engineering Drawing.
11. A balanced layout is very important and candidates will be penalised for poor planning.
12. Work neatly.

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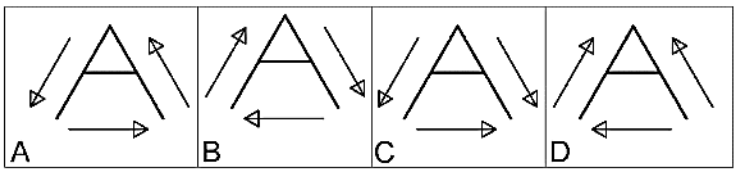
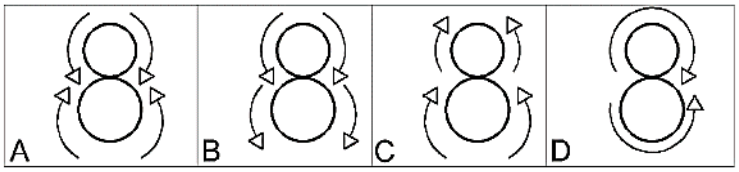
QUESTION 1: FUNDAMENTALS OF ENGINEERING DRAWING, MACHINE SYMBOLS AND WELDING

1.1 Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.8) on the DRAWING SHEET.

1.1.1 Which ONE of the following methods is the correct way to print the letter A on a drawing?



1.1.2 Which ONE of the following methods is the correct way to print the number 8 on a drawing?



1.1.3 How is a centre line in a drawing indicated?

A

B

C

D

1.1.4 A view has been drawn to scale 1:10.

If a measurement is 102,5 cm in real life, what length will it be drawn on the view?

A 1 025 mm
B 102,5 mm
C 21 500 µm
D 12,5 m

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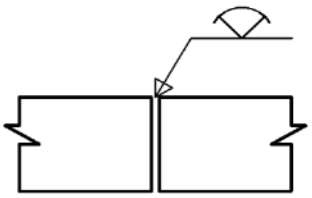
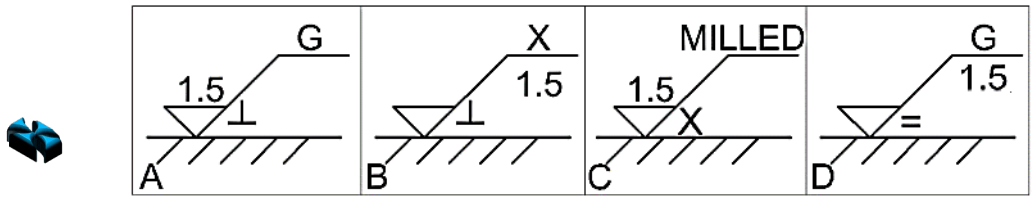
1.1.5 Which type of weld is indicated by the following symbol?



A Square butt
B Spot
C Fillet
D Single V-butt

1.1.6 A surface texture of 1,5 micrometres can be produced by grinding. The direction of lay must be perpendicular with the removal of material.

Which ONE of the following machine symbols best describes this process?



1.1.7 In dimensioning, the lines enclosing the dimension line are:

A Leader lines
B Dimension lines
C Extension lines
D Outlines

1.1.8 When dimensioning the radii, the dimension line begins from the centre of the circle.

A True
B False

(8 × 1) (8)

1.2 Give TWO guidelines for freehand drawing. (2)

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1.3 FIGURE 1 shows a sectional view through a counterbore hole. The hole diameter is Ø8 mm and the counter hole is Ø15 mm.

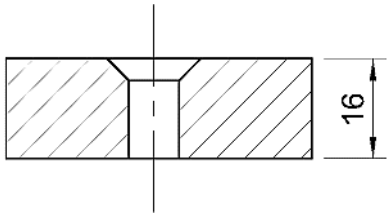

FIGURE 1

Redraw the sketch and place the given dimensions in the correct positions for the counterbore hole. Include the angle of the counterbore hole. (5)
[15]

QUESTION 2: SCREW THREADS

FIGURE 2 shows a front view of a square-threaded cap.

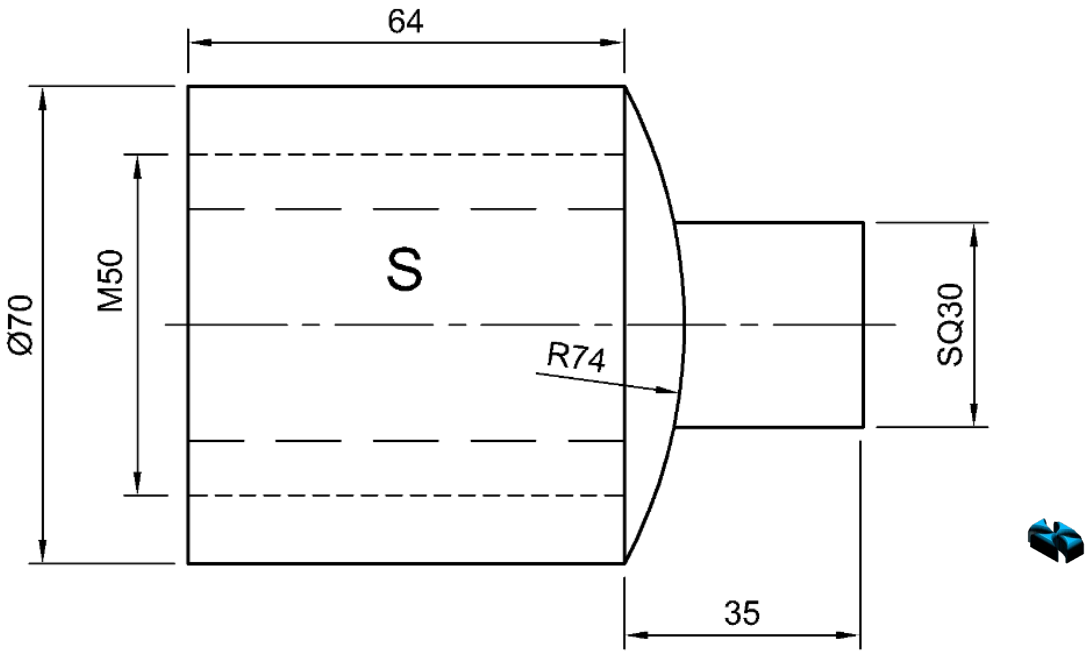

FIGURE 2

Draw, to scale 1:1, the following:

2.1 A sectional front view providing part S with a left-hand internal square thread using a pitch of 16 mm (7)

2.2 An outside right view (1)

Line work, accuracy, layout and neatness (4)
[12]

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QUESTION 3: FIRST-ANGLE ORTHOGRAPHIC PROJECTION

FIGURE 3 on the next page shows two views of a support-arm connector.

Draw, to scale 1:1, the following views of the support-arm connector in first-angle orthographic projection:

3.1 A full-sectional front view on cutting plane A-A (8)

3.2 An outside top view without hidden detail (3)

3.3 An outside left view without hidden detail (3)

3.4 Print the following title and scale centred beneath the layout.

CONNECTION ARM
SCALE 1:1 (2)

3.5 Insert the first-angle orthographic projection symbol below the title and scale. (1)

Line work, accuracy, layout and neatness (6)

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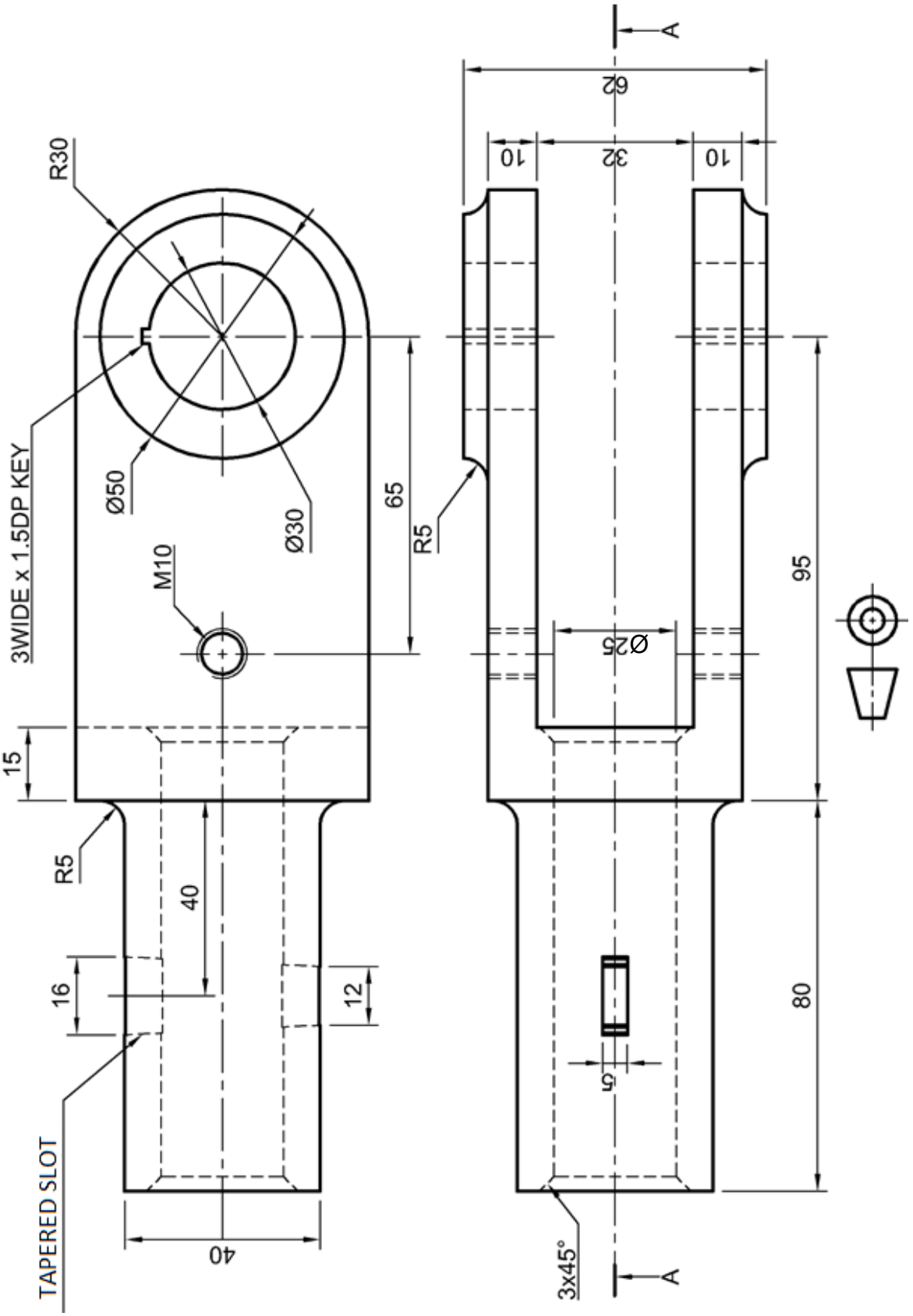

FIGURE 3

[23]

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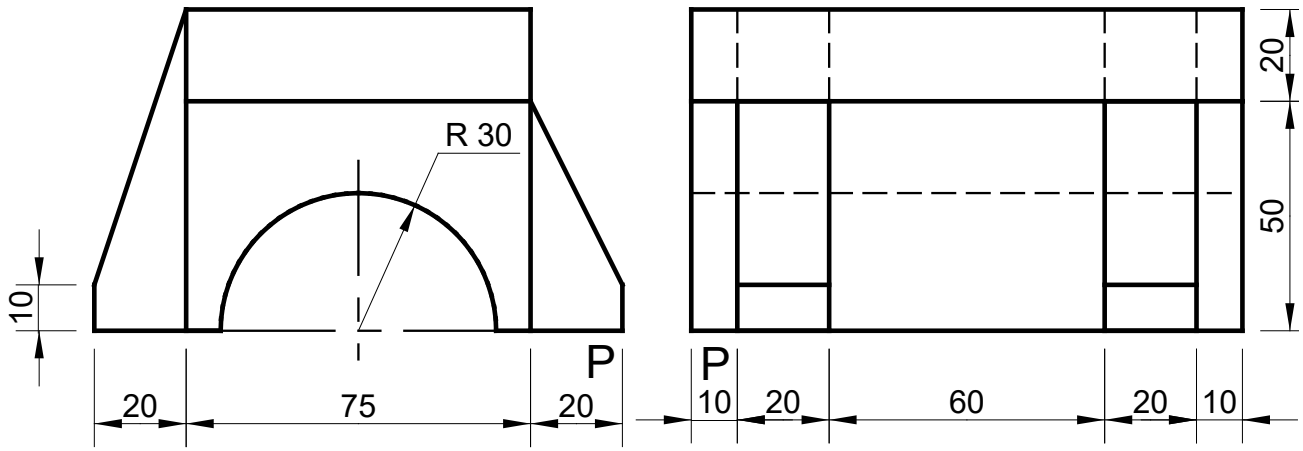
QUESTION 4: ISOMETRIC

FIGURE 4 shows two views of a casting drawn in third-angle orthographic projection.

Do not draw the two given views, but draw, to scale 1:1, an isometric view of the casting. Point P must be the lowest point.

No hidden detail is required.



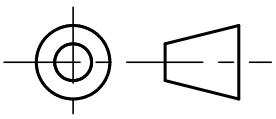


FIGURE 4

[14]

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QUESTION 5: INTERPENETRATION

FIGURE 5 shows two views of a T-end without the interpenetration lines in third-angle orthographic projection.

Redraw, to scale 1:1, the TWO given views and show the following:

5.1 The interpenetration curve on the front view

5.2 All construction lines needed to project the curve of interpenetration

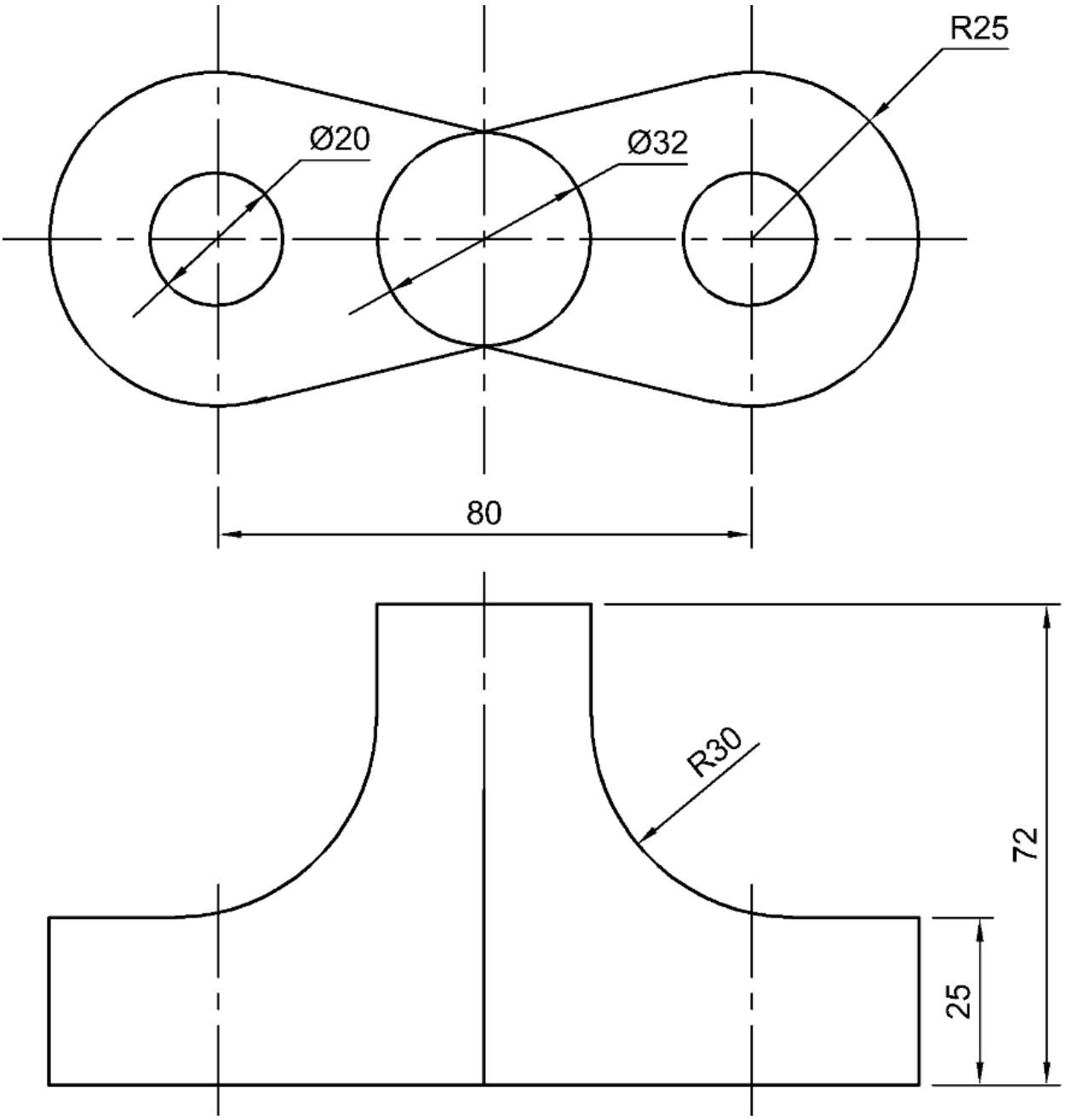

FIGURE 5

[13]

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QUESTION 6: THIRD-ANGLE ORTHOGRAPHIC PROJECTION AND MACHINE SYMBOLS

FIGURE 6 on the next page shows a front and right view of a cable support in third-angle orthographic projection. The pulley and base are joined together by means of an M14 hexagon head bolt with a spring washer and an M14 hexagonal nut. The bolt, spring washer and nut have been omitted.

6.1 Draw, to scale 1:1, the following views in third-angle orthographic projection:

6.1.1 A full-sectional front view showing the bolt, spring washer and nut in the correct position (8)

6.1.2 An outside top view showing the bolt, spring washer and nut in the correct position without hidden detail (6)

6.2 Insert the third-angle orthographic projection symbol in a space beneath the layout (1)

6.3 Add a machining symbol at A with a roughness value of 5,5 µm that must be produced without the removal of material. (2)

Line work, accuracy, layout and neatness (6)

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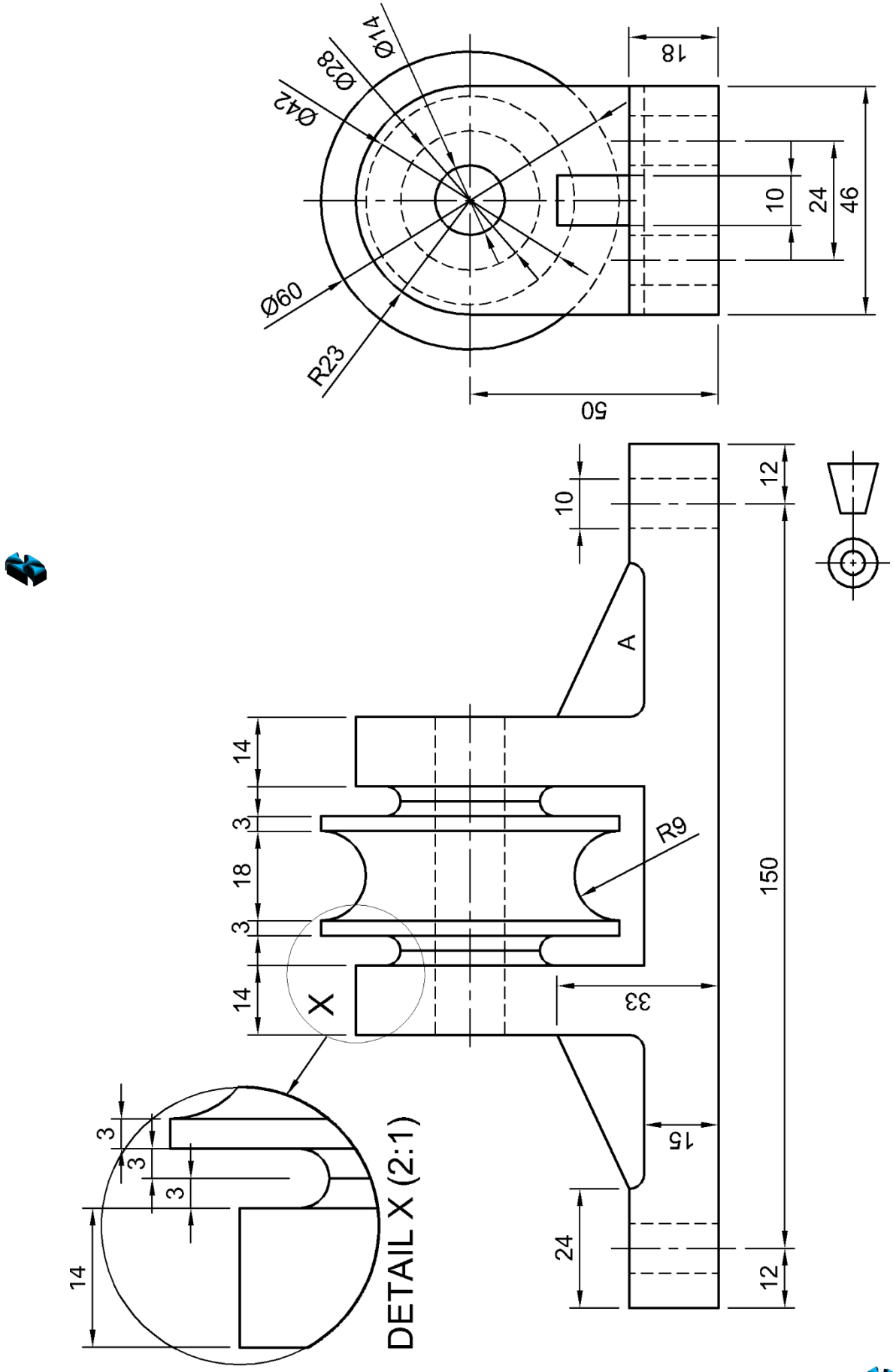

FIGURE 6

[23]

TOTAL: 100

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