



STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1999

INDUSTRY STUDIES

2 UNIT

METAL AND ENGINEERING STRAND SECTION II

(30 Marks)

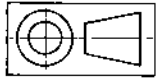
*Total time allowed for Sections I and II—One hour and a half
(Plus 5 minutes reading time)*

DIRECTIONS TO CANDIDATES

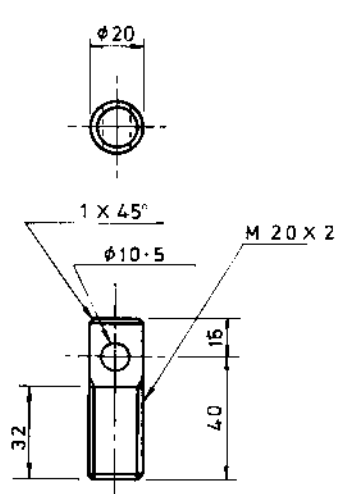
- Write your Student Number and Centre Number at the top right-hand corner of this page and page 9.
- Questions 1 and 2 are COMPULSORY.
- Attempt ONE question ONLY from Questions 3, 4 and 5.
- Answer the questions in the spaces provided in this paper.
- Board-approved calculators may be used.

QUESTION 1 This question is COMPULSORY. (10 marks)

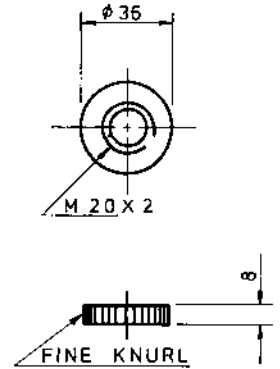
Details of components of a machinist's jack are given.



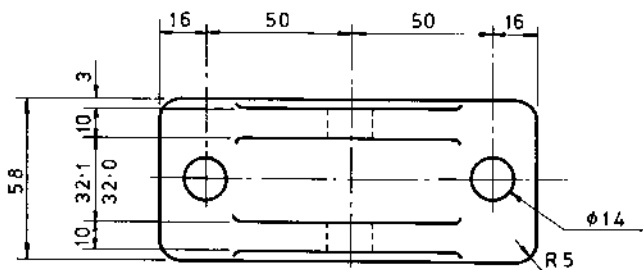
MACHINIST'S JACK



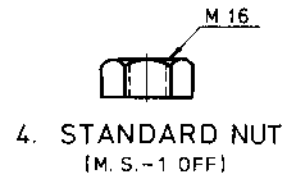
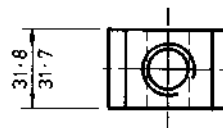
5. SCREW
(M. S. - 1 OFF)



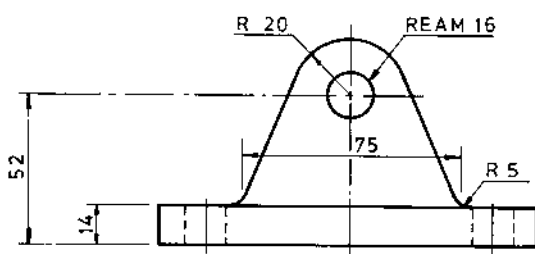
6. LOCK NUT
(M. S. - 1 OFF)



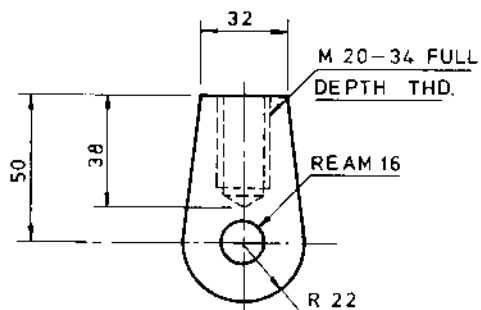
1. BASE
(C. S. - 1 OFF)



4. STANDARD NUT
(M. S. - 1 OFF)



2. SWIVEL
(M. S. - 1 OFF)



3. BOLT
(M. S. - 1 OFF)

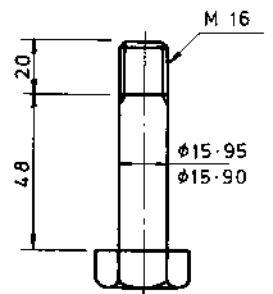


FIG. 1

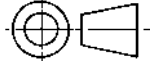
QUESTION 1 (Continued)

(a) Refer to the drawing of the Machinist's Jack shown in Figure 1 on the previous page.

(i) State the type of drawing shown in Figure 1.

.....

(ii) State what the following symbol indicates.



.....

(iii) Determine the sizes of the following features:

- | | | |
|---|--|-------|
| 1 | Overall length of the base | |
| 2 | Size of the fillet on the base | |
| 3 | Maximum thickness of the swivel | |
| 4 | Finished depth of the M20 thread in Item 2 | |
| 5 | Chamfer on the screw | |

(iv) Why is the size at the bolt expressed as $\frac{\varnothing 15.95}{\varnothing 15.90}$?

.....

(v) What is the maximum possible clearance between the Ream 16 hole in the swivel and the bolt shaft?

.....

(vi) Referring to Item 5: Screw, state the meaning of M.S.–1 OFF.

.....

(vii) Name the material used for the base.

.....

(viii) What hand tools would you use to tighten the following items?

- | | | |
|---|------------------|-------|
| 1 | M16 nut and bolt | |
| 2 | Lock nut | |

(ix) How many items make up the assembled jack?

(x) Assuming the screw engages the swivel to a depth of 15 mm, state the overall height of the assembled jack.

.....

QUESTION 1 (Continued)

(b) Each diagram below shows an engineering process.

(i) Name EACH process.

(ii) Briefly state a use for EACH process.

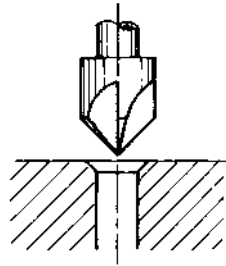


FIG. 2

Name

Use

.....

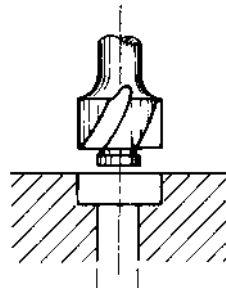


FIG. 3

Name

Use

.....

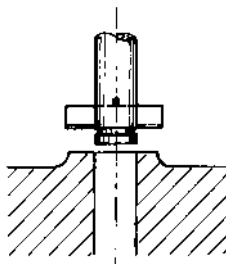


FIG. 4

Name

Use

.....

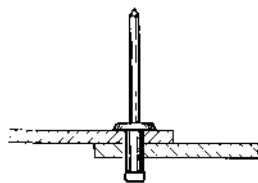


FIG. 5

Name

Use

.....

QUESTION 1 (Continued)

(c) Determine the reading on the vernier scale illustrated below.

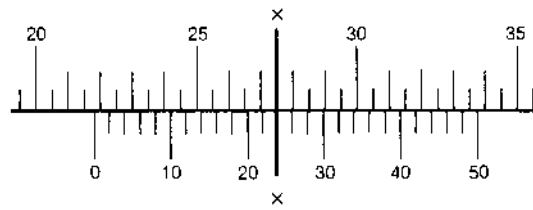


FIG. 6

Reading mm

(d) Name and give an appropriate use for the following gauges.

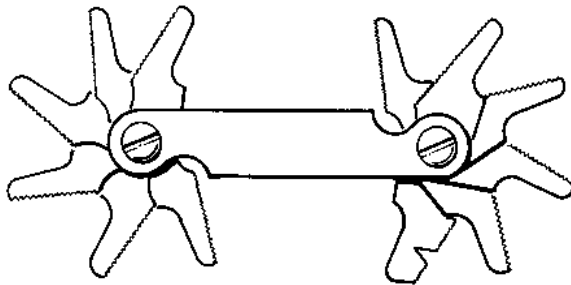


FIG. 7

Name

Use

.....

.....

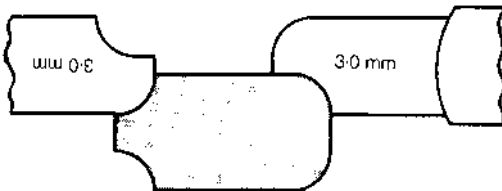


FIG. 8

Name

Use

.....

.....

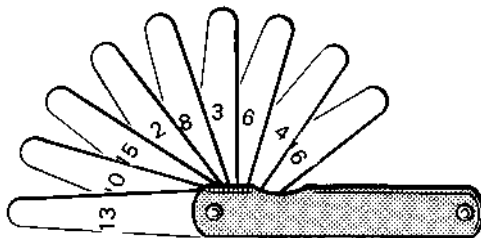


FIG. 9

Name

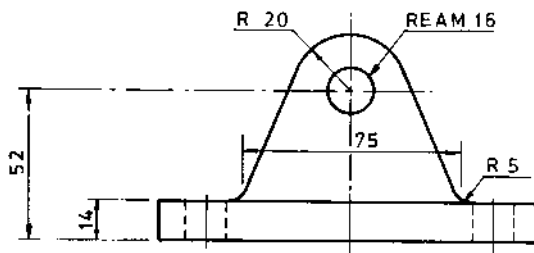
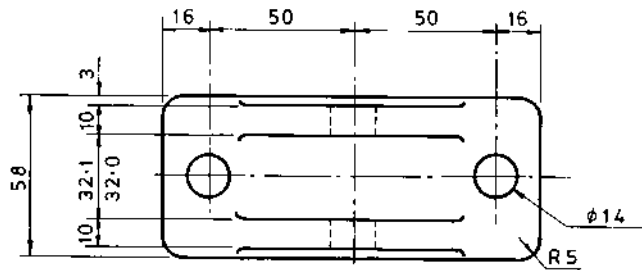
Use

.....

.....

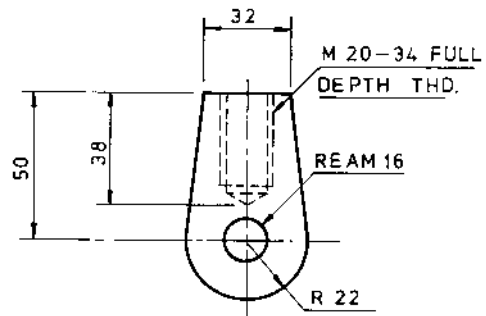
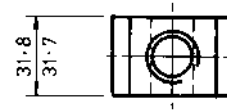
QUESTION 2 This question is COMPULSORY. (8 marks)

(a) Figures 10 and 11 below show detailed drawings of Items 1 and 2 of the Machinist's Jack.



1. BASE
(C. S. - 1 OFF)

FIG. 10



2. SWIVEL
(M. S. - 1 OFF)

FIG. 11

(i) Give the overall dimensions of Item 1.

.....

(ii) State the tool(s) required and procedure to be followed to accurately mark out the centres of the two $\varnothing 14$ holes in Item 1.

Tool(s)

Procedure

.....

.....

QUESTION 2 (Continued)





- (iii) Outline a procedure that could be followed to mark out and produce an M20 × 2 blind thread in the swivel.

<i>Procedure</i>	<i>Tool(s) required</i>

Question 2 continues on page 8

QUESTION 2 (Continued)

- (b) Complete the table below by naming the power tools pictured. State TWO common applications for EACH tool.

<i>Portable power tools</i>	<i>Name</i>	<i>Applications</i>
		(i) (ii)
		(i) (ii)
		(i) (ii)
		(i) (ii)

- (c) Observation of safety precautions is essential. State ONE personal safety precaution and TWO safety inspections made on an angle grinder before use.

Personal safety precaution:

Safety inspections:

- (i)
(ii)

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Attempt ONE question ONLY from Questions 3, 4 and 5.

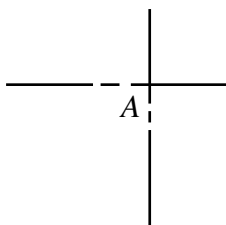
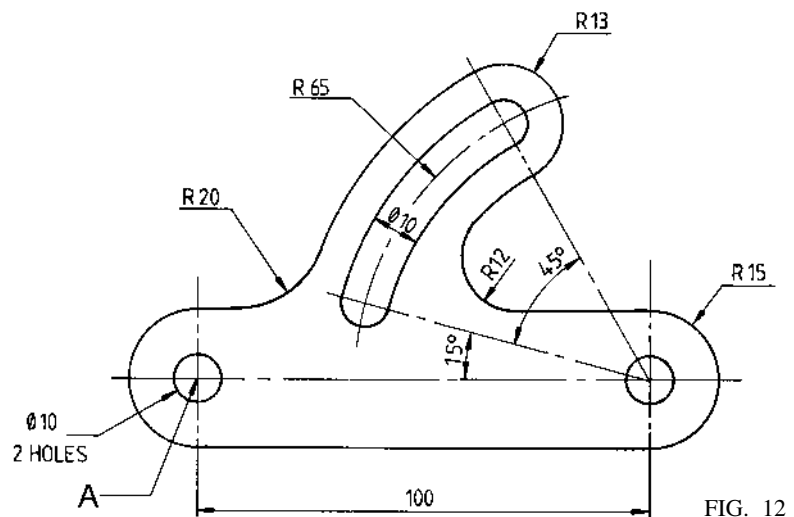
EITHER

QUESTION 3 (12 marks)

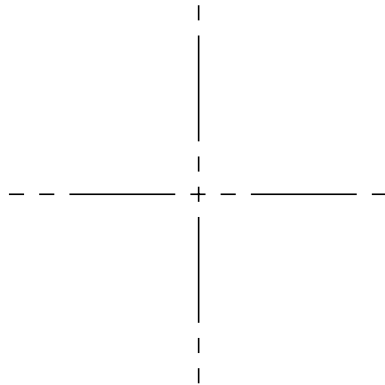
Details of a conveyor link are shown in Figure 12.

Using the centre lines given below for centre A, make an accurate full-size drawing of the spacer. Use **correct geometrical construction** to locate all centres, tangency and limiting points.

NOTE. Construction lines are NOT TO BE ERASED.



OR



OR

Please turn over

QUESTION 5 (12 marks)

The top and front views of a support bracket are shown in Figure 14.

In the space below, draw **a full-size, freehand, isometric sketch** of the bracket when viewed from the direction indicated by the arrow.

The centre of the top of the $\varnothing 48$ hole is given below.

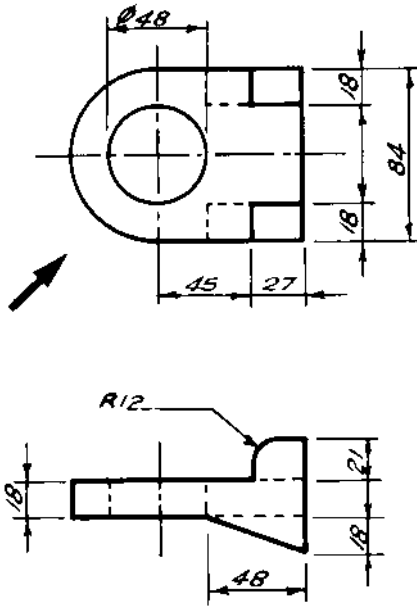
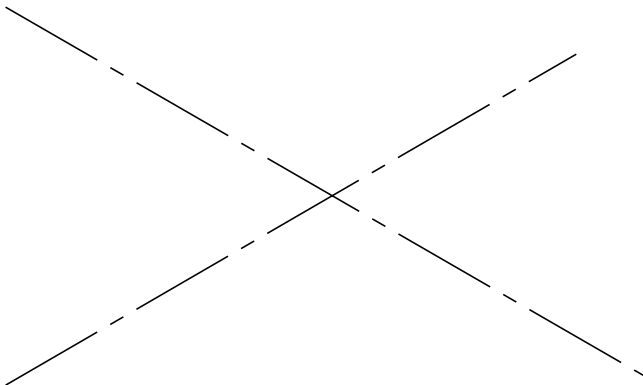


FIG. 14



End of paper