4.17   METALWORK (445)

4.17.1 Metalwork Paper 1 (445/1)

1.   (a)   An apprentice is a person on the job training for a specified period.   (1 mark)

      (b)   When no profit or loss is made in any sales/business.   (1 mark)

2.   (a)   Uses of a steel rule:

              -        measuring
              -        marking
              -        testing of flatness/straightness.

                                                                        $(3 \times \frac{1}{2} = 1\frac{1}{2}$ mark)

      (b)   (i)
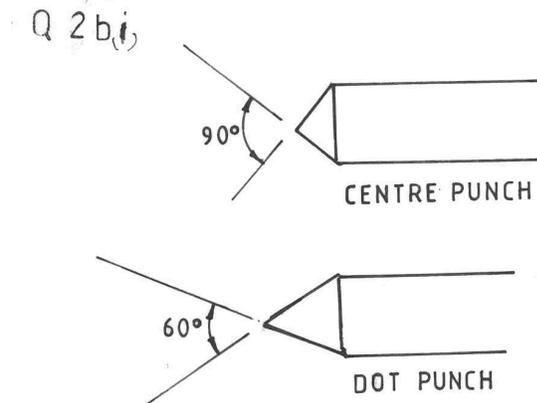
              Sketch - 2 x 1 - 2 marks

              (ii)   emphasis lines/markings
                      -        locate centre of circles or arc

                                                                        Uses $2 \times \frac{1}{2}$ = 1 mark

3.   (a)   -   make edge safe
              -        made edge strong
              -        improve aesthetics

                                                                        any 2 x 1 = 2 marks

      (b)   -   clean
              -        apply premises coat
              -        apply 1st coat
              -        apply finishing coat

                                                                        4 steps x $\frac{1}{2}$ = (2 marks

4. (a) -   clean the metal
        -    heat to bright red
        -    cool it in caseinate compound
        -    re-heat
        -    quench

                                          5 steps x $\frac{1}{2}$ = ($2\frac{1}{2}$ marks)

    (b) (i)   Chromimium - imparts stainless properties and adds to hardness.

        (ii) Manganese - increases resistance and adds strengths.
                                          2 x 1 = 2 marks

5. (a) Process of increasing thickness at expense of length.   (1 mark)

    (b) -   To increase its strength.
        -    For decoration purpose.
                                          2 x 1 = 2 marks

6. (a) (i)   used for very fine work.
        (ii)   handles are not required for the work involved is very light
        (iii) to provide a firm grip.
                                          3 x 1 = 3 marks

    (b) (i)   Rivet ϕ = 1½t
                    = 1.5 x 3
                    = 4.5 mm

                    formula   ½
                    substitution   ½
                    answer   ½
                                       1½
        (ii) Head allowance

                    =   1½ x ϕ
                    =   1.5 x 4.5
                    =   6.75 mm

                    formula   ½
                    substitution   ½
                    answer   ½
                                       1½

7. (a) (i)   It causes scale to work into the joint.
        (ii)   So that both parts are brought to the correct heat at same time.
                                          1 x 2 = 2 marks

(b) (i)   They are short runs at intervals along the joint.
     (ii) They assist in keeping the plates to be welded in perfect alignment or
           Holding two pieces of metals together.

                                                              (1½ x 2) = 3 marks

Q 8

PARALLEL TURNING

WORKPIECE

DOR

FEED

TOOL

Workpiece = 1/2
Tool   = · 1/2
Feed   = 1/2
           _____
           = 1½ marks

FACING

WORKPIECE

DOR
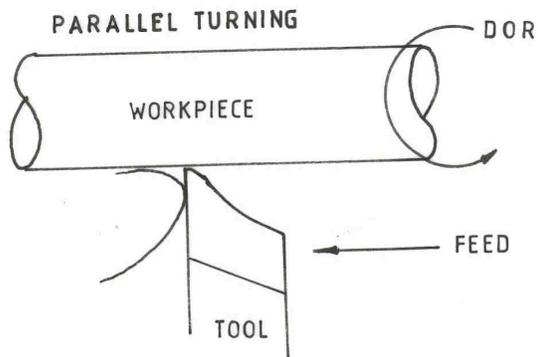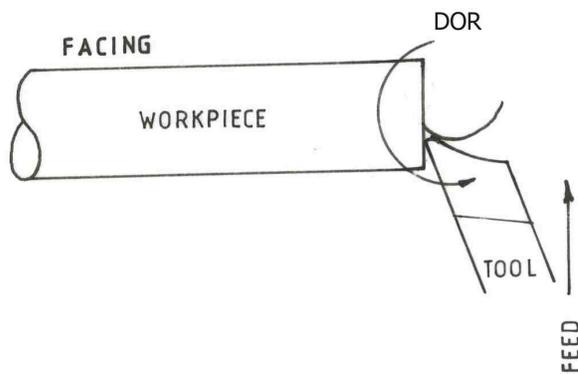
TOOL

FEED

Workpiece = 1/2
Tool   = 1/2
Feed   = 1/2
           _____
           = 1½ marks

9. - Dry heat
    - Electricity
    - Lightening
    - Revolving wheels/belts/ropes
    - Acid
    - Steam
    - Hot metals/objects
    - Fires or flames

                                                         any 4 x ½ = 2 marks

Q 10
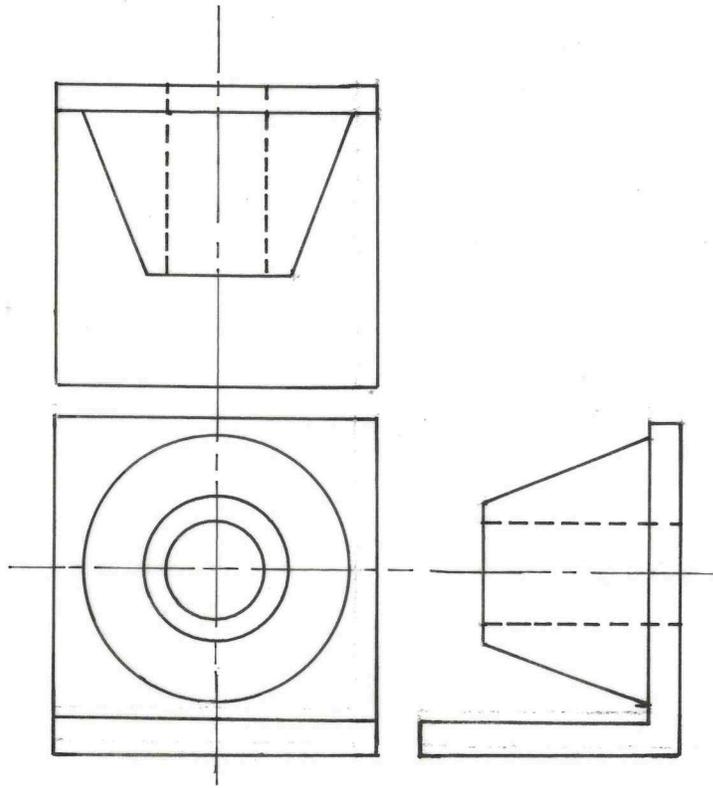
- 10 faces × 1/2 = 5
- Angle of projection = 1

Total = 6 marks

11.
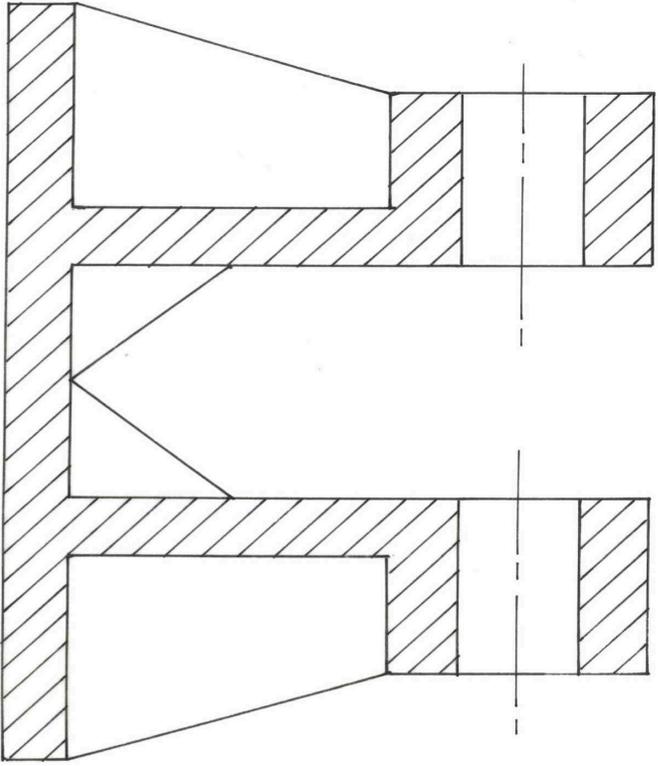
SECTION A - A
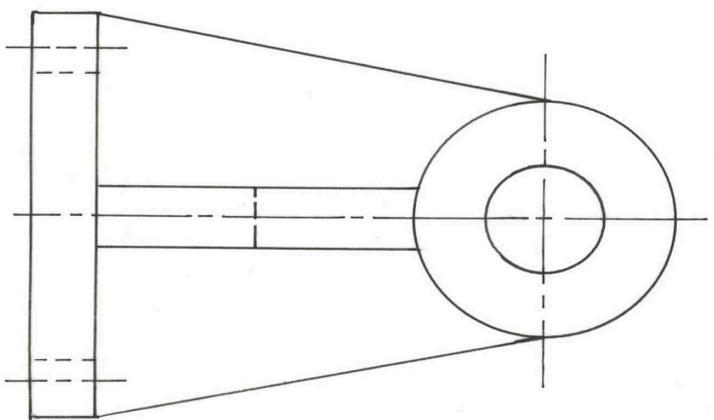
END ELEVATION

F.E. 9 faces × 1/2   = 4½
3 hatching × 1/2   = 1½
E.E. 6 faces × ½   = 3
Centre lines   = 2
Hidden details   = 2
Scale   = 2

Total = 15 marks

Q11

12. (a) - Verify that all cables insulations are intact.
          - Make sure all terminals are secure.
          - Ensure that the conductors used are of the correct current rating.
          - Ensure that the equipment is adequately earthed.
          - Be familiar with locations of the "off" positions of the mains switch.

                                                                Any 4 x 1 = 4 marks

     (b) (i)   - Scratch method
               - Tapping method

                                                                2 x ½ = (1 mark)

          (ii) • Scratch method
                   Advantage: - easy for beginners
                   Disadvantage - dirtifies the surface.

                                                                2 x 1 = 2 marks

               • Tapping method

                   Advantage   -   gives clean surface
                   Disadvantage -   rod tends to stick on weld.

                                                                2 x 1 = 2 marks

Q 12.C

(i)

Porosity

(ii)

Slag inclusion

(iii)

Under cut

(iv)

Lack of penetration

(v)

Lack of fusion

(vi)

H Hollow surface

Sketch   = 4
Naming,   Any 4 × 1/2   = 2
                                    _____
                              Total = 6 marks

510

13. (a) (I)

Q13a.(i)   Face the work (1/2)

Workpiece (1/2)

FEED

Chuck (1/2)

TOOL (1/2)
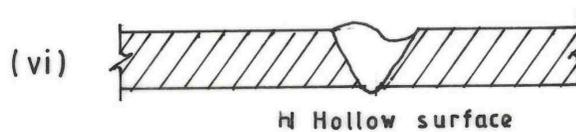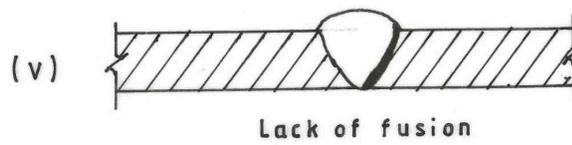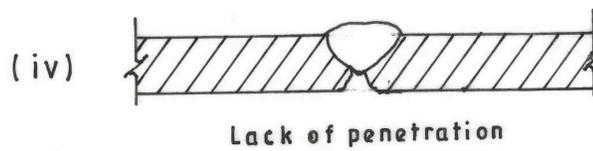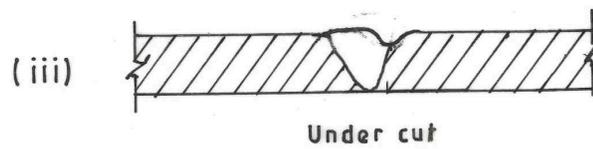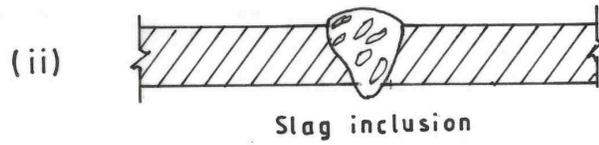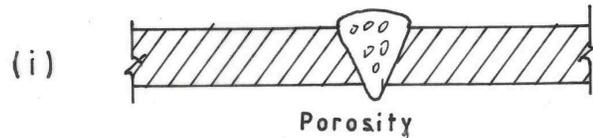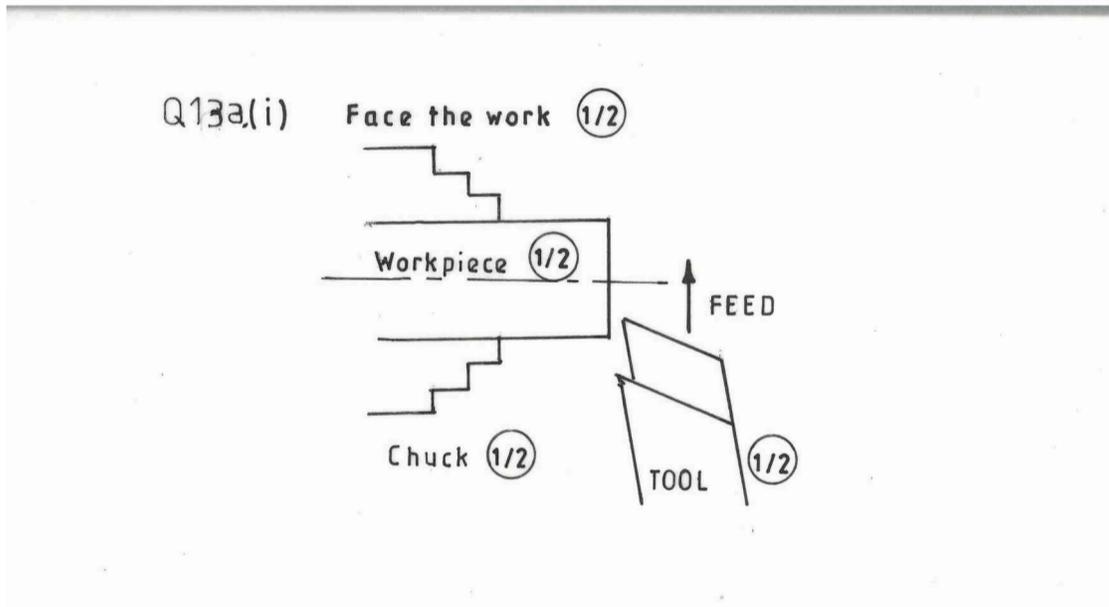
- Hold work on the chuck
- face the end using cross slide

II.   Centre drill

Q13 a.(ii) Centre drill

Spindle (1/2)

Tail stock (1/2)

DOR

FEED (1/2)

Workpiece

Chuck (1/2)

Centre drill (1/2)

Total = 2½ marks
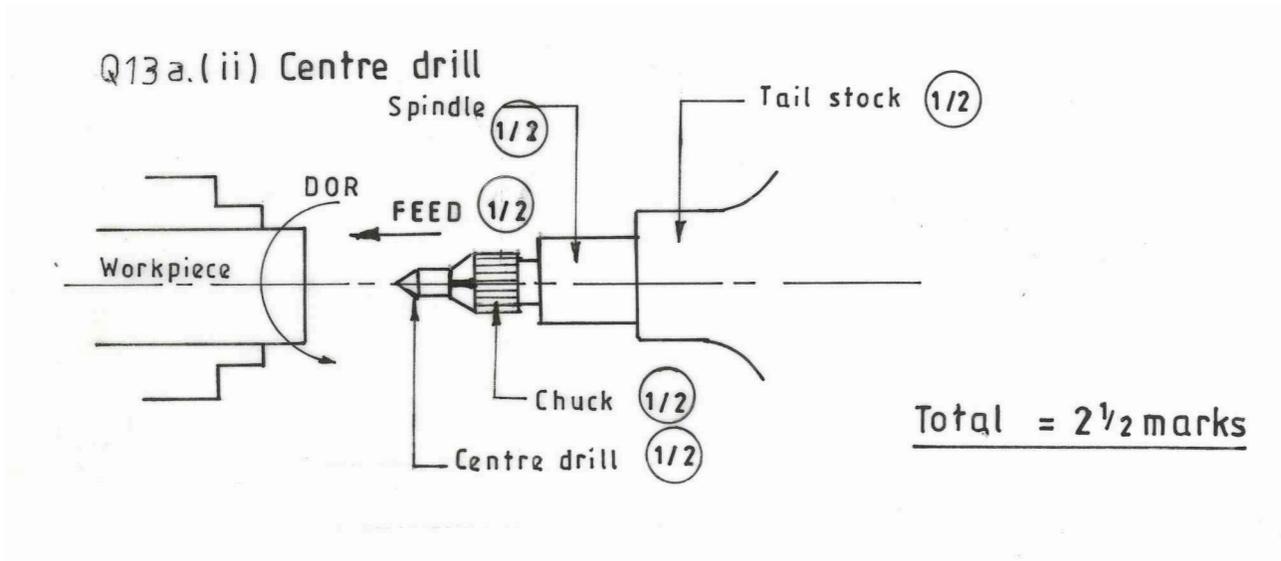
- use drill chuck to chuck to hold the centre drill
- hold chuck on the spindle of the tailstock.
- lock the tailstock on the machine bed.
- feed the centre drill into the rotating work.

Q 13a.

(iii) Drilling the work
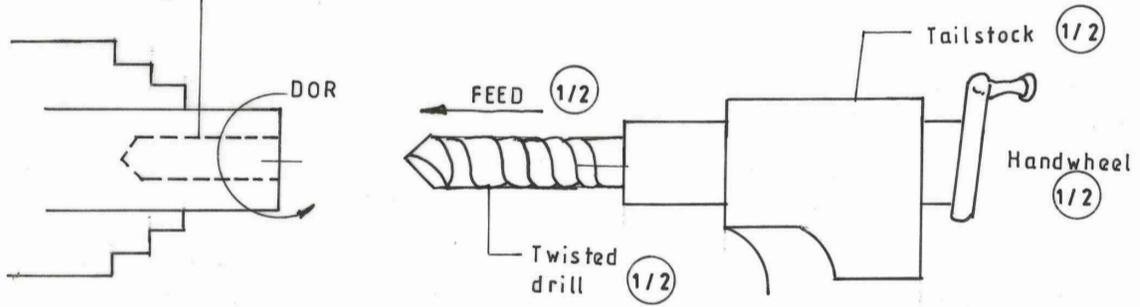
Sketch   3 × 2 = 6
Steps   8 × 1/2 = 4
           Total = 10 marks

-        Replace centre drill with twirt drill.
-        feed the drill into the rotating work using tailstock wheel

sketches   3 x 2   =   6 marks
steps   8 x ½   =   4 marks
                                                 10 marks

(b)   Short taper turning methods

Q13b.
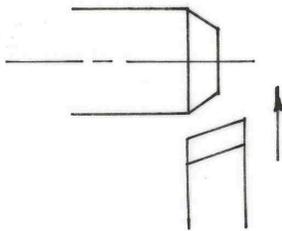
Form tool method
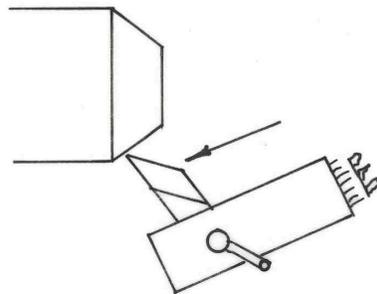
Compound slide method
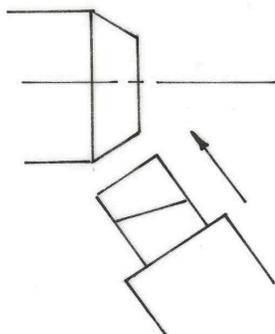
Setting the tool

Sketching 2×2 = 4
Stating   2 x 1/2 = 1
                Total = 5 marks

14. (a)
1. check the nominal thread diameter of the bar.
2. File the end of the rod.
3. Chamfer.
4. Fix the die in the stock.
5. Open the die by tightening the centre set screw.
6. Position the die on the end of the bar, ensuring squareness.
7. Start the cutting by turning the die a quarter a resolution in a clockwise direction
8. Apply cutting lubricant, with a gentle downward pressure
9. Reverse the direction of the die to break the chip taking the next half turn
10. Continue cutting until the required length, then remove the die
11. Adjust the depth of cut by loosening the centre set screw, and tightening the other two
12. Repeat steps 5 - 8 until the correct depth of thread has been achieved.

10 steps x ½ = (5 marks)

Q14 b,
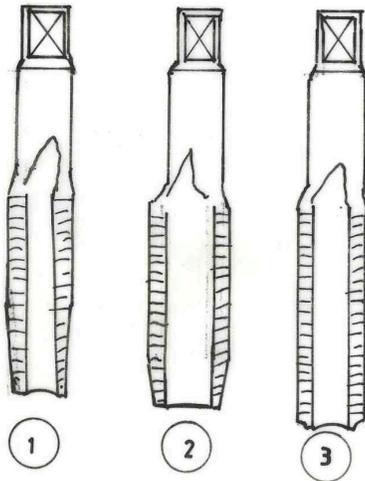
① Taper tap
   Taper 10 threads

② Second or
   Taper 5 threads

③ Plug or Bottoming
   Taper 1½ threads

Sketching   3 x ½ = 1½ marks
Naming   3 x 1 = 3
             Total = 4½ marks

Q14 c.

Teeth (½)
Tip (½)
Body (½)
Edge (½)
Shoulder (½)
Ferrule (½)
Handle (½)
Tang (½)

Sketch   = 1
Points 8 x 1/2 = 4
Total = 5 marks

513
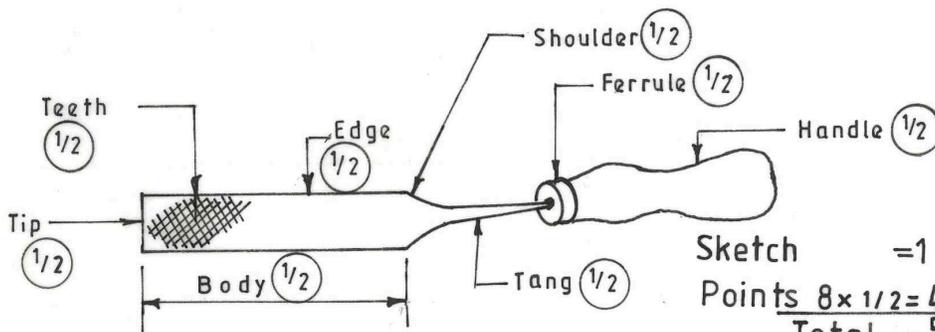
15.　(a)　(i)　Excessive speed for the material being cut.

Lack of a suitable cutting solution.
　　　(ii)　Excessive lip clearance angles.
　　　　　Too heavy a feed.

　　　(iii)　Drill is blunt
　　　　　No cutting solution
　　　　　Too much feed
　　　　　Drill is badly ground.

(6 marks)

Q15 a.
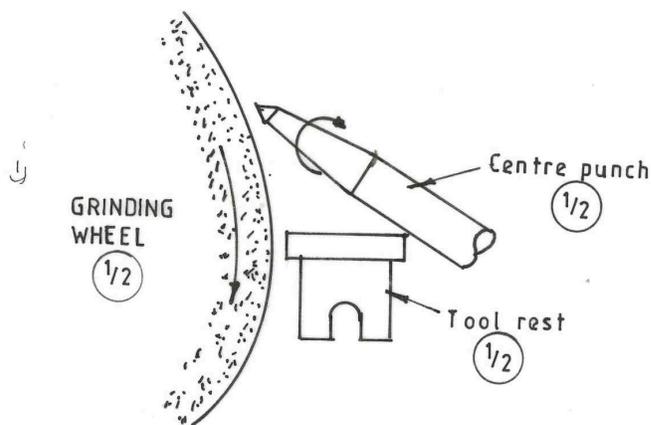
Sketch　　　　= 3
Labelling　　= 1½
　　　　Total　= 4½ marks

Grinding lines　1½ marks
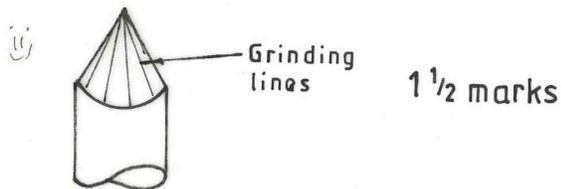
Safety precautions when grinding.

(i)　Use the whole face of the wheel to maintain its flatness.
(ii)　Goggles should be worn all the time.
(iii)　The tool rest must be adjusted to be close enough to the wheel.
(iv)　Work should be firmly held.
(v)　Use the guards on the grinding machine.
(vi)　Never touch the revolving wheel while grinding.

(1 x 3 = 3 marks)