



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**NOVEMBER EXAMINATION 2011**

**FITTING AND TURNING  
NQF LEVEL 2**

**18 NOVEMBER 2011**

**This marking guideline consists of 8 pages.**

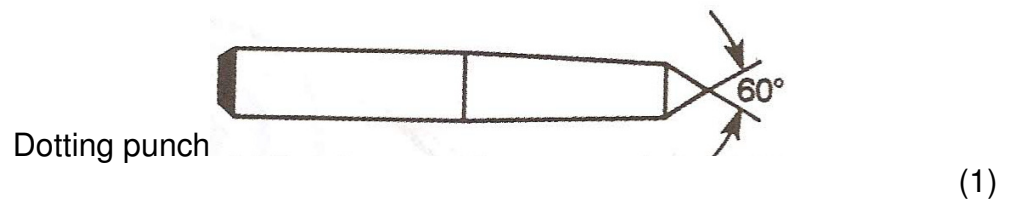
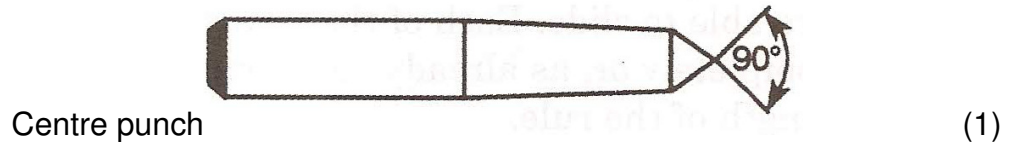
**QUESTION 1: GENERAL**

- |      |   |             |
|------|---|-------------|
| 1.1  | D | (1)         |
| 1.2  | H | (1)         |
| 1.3  | G | (1)         |
| 1.4  | I | (1)         |
| 1.5  | B | (1)         |
| 1.6  | J | (1)         |
| 1.7  | A | (1)         |
| 1.8  | E | (1)         |
| 1.9  | F | (1)         |
| 1.10 | C | (1)         |
|      |   | <b>[10]</b> |

**QUESTION 2: MARKING OFF**

- |     |       |                 |     |
|-----|-------|-----------------|-----|
| 2.1 | 2.1.1 | Dividers        | (1) |
|     | 2.1.2 | Jenny callipers | (1) |
|     | 2.1.3 | Scriber         | (1) |

- 2.2 2.2.1



- 2.3      2.3.1      **Datum line**  
It is a line from which marking-off is done /starting point from which marking off is done. (1)
- 2.3.2      **The reference face**  
It is a line taken on the side or sides of a work piece from where the marking off can be done. (1)
- 2.4      White wash or chalk and water- (1)
- Copper sulphate- (1)
- Marking blue- (1)
- [10]**

### QUESTION 3: DRILLING MACHINE

- 3.1      • Sensitive drilling machine  
            • Pillar-type drilling machine  
            • Radial drilling machine  
            • Portable hand-drilling machine  
            • **Pneumatic portable drilling machine** (4)
- 3.2       $D = 30\text{mm} = 30/1000 = 0.030\text{m}$   
             $N = 5\text{r/s} = 5 \times 60 = 300\text{r/m}$   
             $S = \pi \times D \times N$   
             $= 3,142 \times 0,030 \times 300 \quad \sqrt{\quad} \sqrt{\quad} \sqrt{\quad}$   
             $= 28.278\text{m/min} \quad \sqrt{\quad}$  (4)
- 3.3      • The drill point wears on the periphery,  
            • The drill point become blunt too quickly  
            • The cutting edges break away or chip.  
            • Drilling of an oversize hole.  
            • The drill point edges burns and becomes blunt.  
            • Vibration of the drilling machine spindle.  
            • The machine spindle is worn and running out-of-true.  
Any THREE correct or relevant drilling faults (3)
- 3.4      • Keep the cutting tool and work piece cool.  
            • Placing a lubricant between the chip and the tool will reduce tool wear caused by friction.  
            • Prevent chips welding or the formation of an edge build-up.  
            • Improve the surface finish of the work.  
            • Flush away chips from the tool and machine bed.  
            • Prevent corrosion of the work piece and machine slide.  
            • Higher cutting speeds and feeds can be achieved.  
            • Cutting tools will last longer, reducing regrinding time.  
            • Reduced friction means less power is required.  
Any FOUR correct or relevant answer (4)

- 3.5 3.5.1 **Countersinking**  
The method by which you remove metal at the top of the hole in order to let screws and rivets be flush with the surface of the material.  
**To provide a recess for the head of a screw. The screw head must either be flush with the surface or it can be slightly lower.**  
**To remove the burr from the hole after drilling.** (1)
- 3.5.2 **Counter boring**  
The processes by which you enlarge the upper part of the drilling hole to accommodate round or cap-head screws.  
**Counter boring is to create seating for cap screw heads so that a flush surface is left after the cap screw is inserted.** (1)  
**[17]**

**QUESTION 4: MILLING MACHINE**

- 4.1 4.1.1 **Dividing head.**  
It is a device that equally divides the circumference of a work piece into a number of parts. (1)
- 4.1.2 **Milling cutter**  
For cutting the work piece./ **for the removal of metal from the work piece to achieve a certain size or shape.** (1)
- 4.1.3 **The machine vice.**  
For holding a work piece. (1)
- 4.2 4.2.1 Cleaning of the machine while it is running is dangerous because:  
  - The milling cutter can cause serious injury.
  - The flying metal shaving can cause serious injury.
Any ONE correct or relevant answer (1)
- 4.2.2 Loose clothing can become caught into moving parts, which will cause serious injury.  
**Your hands can be in the moving parts.** (1)
- 4.3  $D = 120/1000$   
 $= 0,12\text{m}$   
 $V = \pi DN$   
 $N = V/\pi D$   
 $= 40/\pi \times 0,12$        $\checkmark$      $\checkmark$   
 $= 40/0,37704$        $\checkmark$   
 $= 106,0895\text{r/pm}$        $\checkmark$  (4)
- 4.4  $V = \pi DN$   
 $N = V/\pi D$   
 $= 20/\pi \times 0,2$        $\checkmark$   
 $= 31,827\text{r/m}$        $\checkmark$   
 $F = f_t \times T \times N$   
 $= 0.051 \times 16 \times 31,827$        $\checkmark$   
 $= 25,971\text{mm}$        $\checkmark$  (4)

- 4.5
- Insert the bolts through the T-slots in the machine table.
  - Fit the slots in the angle plate over the bolts and lower the angle plate onto the machine table.
  - Fit washers over the bolts and then screw on the nuts and hand-tighten the angle plate.
  - Check that the angle plate is in line with the x-axis of the machine table with a clock gauge.
  - **Fit the gauge needle so that it** touches the flat face of the angle plate mounted onto the machine table 5 mm from the edge.
  - Use the hand wheel to move the machine table lengthwise, so that the
  - Needle of the clock gauge runs along the length of the face of the angle plate.
  - The clock gauge will indicate if the angle plate is out of line with the X-axis of the machine table.
  - If the angle plate is out of line, then you need to adjust the angle plate.
- ½ Mark for every correct or relevant answer
- (5)  
[18]

#### QUESTION 5: SURFACE GRINDER

- 5.1
- To obtain the required size of the work piece.
  - To make the outside of the work piece smoother when it has to slide on or in another component.
  - To give the work piece a good finish.
  - **To machine hard metals/materials**
- Any ONE correct or relevant answer**
- (1)
- 5.2
- Horizontal spindle
  - Reciprocating table
  - Rotating table
  - Vertical table
  - Reciprocating table
  - Rotating table
- Any THREE correct or relevant answer**
- (3)
- 5.3
- A. Silicon carbide abrasive
  - B. Coarse grit size
  - C. Medium grade
  - D. Silicate bond type of grinding wheel
- (4)

5.4 5.4.1 Scratch marks on the work piece.

CAUSE	SOLUTION
Dirty coolant	Clean the system and replace coolant
Loose particles between the wheel and the work piece	Flush out all the dirt particles from the surrounding area of the wheel and work piece.
	Keep a constant flow of coolant on the work piece.

Any ONE cause and one solution (2)

5.4.2 Burn marks on the work piece.

CAUSE	SOLUTION
Wheel is too hard for the work piece material	Use a softer wheel
Excessive wheel pressure on the work piece	Decrease the depth of cut.
Table speed too slow	Increase the table speed.
Working without or a lack of coolant	Use coolant/increase coolant

Any ONE cause and ONE solution (2)

5.5 5.5.1 Dressing a grinding wheel is when the appropriate wheel dresser is used to remove the blunt particles and restoring the sharpness of the wheel. Dressing a wheel does not necessarily true the wheel. (2)

5.5.2 Truing a grinding wheel is when the appropriate wheel dresser is used to remove blunt wheel particles as well as to bring the wheel back to its original shape. (2)  
Using the wheel dresser to make sure the wheel runs true. [16]

## QUESTION 6: CENTRE LATHE

- 6.1
- Headstock
  - Chuck
  - Tailstock
  - Bed
  - Apron
  - Cross-slide
  - Gearbox

**ANY FOUR**

(4)

- 6.2
- Facing
  - Boring
  - Drilling
  - Taper turning
  - Parting off
  - For screw cutting
  - Making parts/work pieces round and to specific sizes

**ANY FOUR**

(4)

6.3

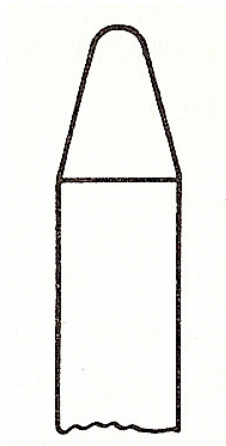
ADVANTAGES	DISADVANTAGES
1. The chuck can hold a wide range of hexagonal and cylindrical work pieces 2. There are jaws available for external and internal work piece 3. You can easily mount the work piece 4. You can easily mount the work piece 5. Setting up time is reduced	1. The three jaw self-centring chuck is inaccurate as it becomes worn 2. The chuck can hold only hexagonal and cylindrical work pieces 3. Accuracy of concentricity is limited when you reverse the work piece 4. You cannot correct any run-out

**Any TWO advantages and TWO disadvantages**

(4)

6.4

6.4.1



A round –nose tool

(1)

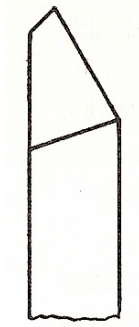
6.4.2



A rough tool

(1)

6.4.3



A finishing tool

(1)

6.5  $S = \pi \times D \times N$   
 $= 3,142 \times 60/1000 \times 800$      $\checkmark \checkmark \checkmark$   
 $= 150,816\text{m/min}$      $\checkmark$

(4)  
[19]

**QUESTION 7: WELDING/JOINTS**

- 7.1
- Arc welding
  - Tig welding
  - Gas welding
  - Resistance welding
  - **Mig welding**
- ANY THREE** (3)

- 7.2
- Check that your tools and equipment are in good working condition.
  - Check that the welding machine is in good condition.
  - Select the correct components and settings.
  - Take the appropriate safety precautions.
  - Clean the metals
  - Weld the metals.
- Any FOUR correct or relevant answers** (4)

- 7.3
- Clean any surplus or extra weld and any splatter
  - Clean the work piece surface.
  - Paint or spray on the surface coating that the job needs.
  - Place all scrape material and welding rods ends in a metal bin.
  - Store all remaining material in the material storeroom.
  - Return the extra welding rods to the storeroom.
- Any THREE correct or relevant answers** (3)  
[10]

**TOTAL: 100**