Practice Aptitude Quiz

Metal Fabrication
It is critical for young people to build their career management skills so they can make informed choices regarding their study and training options and navigate a pathway towards their occupation and career of choice.

This career development resource combines labour market information with a practical industry specific activity to help develop awareness about the skills needed to pursue a career pathway in the Metal Fabrication industry.

PART 1: About the Metal Fabrication Industry

1. The Metal Fabrication industry in a nutshell

Key sub-sectors:

- Structural steel fabrication
- Iron and steel casting and forging
- Non-ferrous metals or alloy casting or forging

The Metal Fabrication industry transforms metals into intermediate or end products by forging, stamping, bending, forming, machining and welding. Included in this sector are manufacturers who forge iron and steel, those who fabricate the structural steel components of buildings and other structures, metal container manufacturers who produce boilers, tanks from heavy gauge metals and sheet metal product manufacturers.


3. Weekly average earnings for major occupations:

- Heavy Metal Fabricator - $1,100
- Sheetmetal Trades Worker - $1,100
- Welder (First Class) - $970
- Light Metal Fabricator - $1,100
- Patternmaker - $1,100
- Foundry Tradesperson - $800
Jobs and demand information

Heavy Metal Fabricators (includes Boilermakers) fit and assemble fabricated metal parts into products, set up machining tools, production machines and textile machines, and operate machining tools and machines to shape metal stock and castings.

› Job prospects - Above average
› Weekly earnings - $1,100
› Occupation size - 113,800

Potential entry level qualifications:
› Certificate II in Engineering
› Certificate III in Engineering - Fabrication Trade
› Certificate IV in Engineering

Sheetmetal Workers or Light Metal Fabricators manufacture a variety of products and components using thin sheetmetal materials. They work with galvanised steel, mild steel, stainless steel, aluminium, copper and brass. Sheetmetal workers shape and form the cut material into products by operating sheetmetal shaping and forming machines such as brake presses, folding, bending and rolling machines.

› Job prospects - Average to above average
› Weekly earnings - $1,100
› Occupation size - 11,000

Potential entry level qualifications:
› Certificate II in Engineering
› Certificate III in Engineering - Fabrication Trade
› Certificate IV in Engineering

Foundry Tradespersons (Moulders) produce sand moulds by hand or use moulding machines, pour and trim castings and operate and monitor melting furnaces. Castings may be ferrous or non-ferrous metal and may involve complex shapes.

› Job prospects - Average to above average
› Weekly earnings - $800
› Occupation size - 2,600

Potential entry level qualifications:
› Certificate II in Engineering
› Certificate III in Engineering - Fabrication Trade
› Certificate IV in Engineering
**Welders (First Class)** cut, shape, join and finish metal to make, repair or maintain a variety of metal structures and products. Welders work in the heavy machinery and equipment sector, and sometimes the light metals sector.

- Job prospects - Above average
- Weekly earnings - $970
- Occupation size - 82,000

Potential entry level qualifications:
- Certificate II in Engineering
- Certificate III in Engineering - Fabrication Trade
- Certificate IV in Engineering

**About the qualifications**

Qualifications provide the core skills, knowledge and experience (competencies) required for effective performance on the job plus the option of choosing a range of elective competencies that meet the needs of the employer and the individual.

Employability skills are non-technical skills. They are also sometimes referred to as generic skills, capabilities, enabling skills or key competencies. The Employability Skills are:

- **Communication skills** that contribute to productive listening and understanding, speaking clearly and directly and harmonious relations across employees and customers;
- **Teamwork skills** that contribute to productive working relationships and outcomes;
- **Problem-solving skills** that contribute to productive outcomes;
- **Initiative and enterprise skills** that contribute to innovative outcomes;
- **Planning and organising skills** that contribute to long and short-term strategic planning;
- **Self-management skills** that contribute to employee satisfaction and growth;
- **Learning skills** that contribute to ongoing improvement and expansion in employee and company operations and outcomes;
- **Technology skills** that contribute to the effective carrying out of tasks.
3. Career Pathways Websites

- Australian Apprenticeships Pathways - view potential career pathways for this industry - www.aapathways.com.au/search_job_02.cfm?c=33

Other useful careers sites are:

- MAKE IT! Manufacturing careers website - www.makeit.net.au/index.html
- My Future - www.myfuture.edu.au

4. Job Hunting

Job vacancy website:

- Australian Jobsearch - jobsearch.gov.au/findajob/advancedsearch.aspx The Australian Government’s job site. Input your postcode, select the Occupation Category “Metal and Engineering Trades”, then select “Fabrication Engineering Trades” scroll down to the “Additional Search Criteria” section and click on “Apprenticeships/Traineeships”, then click on the “Find Jobs” button.

Job hunting hints and labour market information:

- Australian Apprenticeships Pathways - www.aapathways.com.au Click on “Search” to find potential Australian Apprenticeships occupation ideas. You can also find Job Hunting hints in the “Self Help” menu item.
- My Future: Labour Market Information - www.myfuture.edu.au/services/default.asp?FunctionID=5400 Click on the map or use the drop down menu to find general labour market information for your region including ‘top occupations and incomes’. Data is based on the most recently available census.

5. Useful Contacts

Here are some links to a range of support services, organisations and government agencies that may help with careers research and job hunting.

Support services:

- Search for your local Australian Apprenticeships Centre - www.aapathways.com.au/search_aac.cfm
- Group Training Organisations employ Australian Apprentices and places them with businesses - www.grouptraining.com.au
- Job Services Australia providers work with eligible job seekers to develop an individually tailored Employment Pathway Plan. The plan maps out the training, work experience and additional assistance needed to find job seekers sustainable employment - www.jobsearch.gov.au/provider/ProviderLocation.aspx?ProviderType=JNS&
5. Useful Contacts - continued

**Industry Organisations:**
- Australian Manufacturing Workers' Union - [www.amwu.org.au](http://www.amwu.org.au)

**Government Agencies:**
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) - [www.csiro.au](http://www.csiro.au)
Part 2: About this Resource

Guidance

This Practice Aptitude Quiz is intended to be a general illustration of some of the key learning standards required of people attempting an Australian Apprenticeships entry level qualification in Metal Fabrication.

The Quiz focuses on literacy and numeracy questions contextualised to this specific industry.

This Quiz has been developed with the assistance of industry, a training provider and the secondary school sector as a careers resource.

The Quiz can be used by a number of different organisations and people such as careers practitioners, Group Training Organisations and Job Services Australia providers with job seekers.

The Practice Aptitude Quiz can be:

› used by careers practitioners with individuals or in a class setting to provide general guidance on the level of study involved in undertaking an entry level qualification in these industries;
› provided to people to enable them to practice their skills before sitting an actual aptitude test;
› used by mathematics teachers as a guide to industry math requirements at the entry point of this particular Australian Apprenticeship career path;
› used by teachers as classroom based activities for students in VET centred studies.

This Quiz does not cover aspects such as general knowledge or complex problem solving or reasoning skills.

The level of reading, writing and arithmetical skills assessed by this Quiz is equivalent to that of a typical young person at Year 11 level.

Please note that rates quoted in this assessment for various items, including pay rates, are not meant to reflect today’s values, but are used purely for mathematical purposes.

The Quiz should be able to be completed in approximately **1 hour and 30 minutes**

Calculators may be used to complete this practice exercise.

After the Quiz

There are a range of support services available to help you find out about courses that may help you improve your literacy and numeracy skills and also your readiness for work.

If you are still at school you should discuss any concerns you may have with your career practitioner. Further information may also be provided by a Job Services Australia provider, an Australian Apprenticeships Centre, a Group Training Organisation or a training provider.
Useful Contacts

Here are some links to job seeker support services:

› Job Services Australia providers work with eligible job seekers to develop an individually tailored Employment Pathway Plan. The plan maps out the training, work experience and additional assistance needed to find job seekers sustainable employment - [www.jobsearch.gov.au/provider/ProviderLocation.aspx?ProviderType=JNS&](http://www.jobsearch.gov.au/provider/ProviderLocation.aspx?ProviderType=JNS&)


Section 1: LITERACY, READING AND COMPREHENSION

1. a. Change these following words into plurals.

   Address  
   Welder  
   Fix  
   Lunch  
   Finish

b. Write these abbreviated words in full.

   DR  
   Wed  
   Jan  
   mm  
   LOL

2. Metal fabrication uses a number of different industrial gases. Write the following gases in alphabetical order in the column below.

   Oxygen   Argon   Hydrogen   LPG (liquid petroleum gas)  
   Nitrogen  Acetylene  Helium  Carbon dioxide
3. Read the following text. In each paragraph there are 7 spelling errors. Correct those errors and list them in the order they appear.

About the Metal Fabrication Trade:
The Metal Fabrication trade offers diverse opportunities in career development. Some of the key attributes an employer may look for in an applicant are, reliability, self-motivation and eagerness to learn. The traditional avenue to become a tradesperson in Metal Fabrication is through an Australian Apprenticeship.

If you are a person who enjoys physical and practical tasks, working with your hands, able to operate in challenging environments and advancing technology, this trade may suit you. Apprentices develop a range of technical knowledge, and organisational skills. Apprentices learn how to safely operate tools, read technical drawings, work with industrial machinery, and also to operate welding equipment and thermal cutting equipment.

Once you have obtained your trade qualifications you have opportunities to enhance your skills and knowledge through post trade studies such as a Diploma in Engineering, for example. It all depends on where your interest develops and what part of the trade you wish to focus on.

<table>
<thead>
<tr>
<th>Paragraph 1</th>
<th>Paragraph 2</th>
<th>Paragraph 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comprehension
4. Read the following information and answer the questions that follow.

The principle of thermal cutting in the Metal Fabrication industry.

A Metal Fabricator Tradesperson is required at times to work with thermal cutting/gouging equipment such as plasma, fuel gas cutting, gouging and heating procedures, to assist in the manufacture of metal products.

Flame cutting principally uses the burning of a gas mixture to generate heat. The mixture often used is oxygen and a fuel gas such as acetylene or LPG (Liquefied Petroleum Gas). The process is also commonly known by such names as oxy-cutting and thermal cutting.

The process used for flame cutting steel depends on a chemical reaction known as oxidisation between heated iron and a pure oxygen jet. When a piece of steel is heated to an ignition temperature of 815°C, a jet of pure oxygen is released under the operator’s control, the iron in the steel will burn to form a substance called iron oxide. The ignition temperature at which the
chemical reaction begins for low carbon steel is 815°C. This is well below its melting temperature which is about 1,450°C.

The chemical reaction generates a great deal of heat. Once the metal begins to burn, the heat generated will lead to a spread of oxidisation through the material. This heat enables the cutting to continue and pierce thick steel sections without overall heating of the metal.

One of the important properties of flame cutting is that the steel contains iron. So for non-ferrous metals, that is metals that contain no iron, the plasma arc torch is used for cutting and gouging to overcome the lack of iron.

Questions

a. For flame cutting/gouging the most common gas combinations used are: (Circle the correct response)
   i) Helium Oxygen and Carbon Dioxide gases
   ii) Oxygen and Acetylene or Oxygen & LPG
   iii) Oxygen, Carbon Dioxide and Hydrogen gas
   iv) Hydrogen Carbon Dioxide and Argon gases

b. The ignition temperature which the oxidisation temperature will occurs is: (Circle the correct response)
   i) 723°C
   ii) 1450°C
   iii) 950°C
   iv) 815°C

c. The flame cutting of steel depends on a chemical reaction known as oxidisation. This reaction occurs between: (Circle the correct response)
   i) Heated pure Oxygen jet and Carbon
   ii) Heated steel and Acetylene gas
   iii) Heated iron and LP gas
   iv) Heated Iron and pure Oxygen jet

d. The temperature oxidisation occurs at is known as: (Circle the correct response)
   i) Oxidisation temperature
   ii) Melting temperature
   iii) Ignition temperature
   iv) Burning temperature
Section 2: SPECIFIC KNOWLEDGE

Look at this diagram of the components of a steel framed building.

Metal fabricators are often required to fabricate and assemble various steel structural joints and sections. It is important that the fabricator has an understanding of the terminologies used in the naming of particular components in these steel structures.

1. Locate the building component numbers from the drawing supplied above and place that number adjacent to what you consider to be the correct description of that building component.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Name/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Base plate - welded to the base of the column member and secured to the footing</td>
</tr>
<tr>
<td>b.</td>
<td>Column - vertical support member of a building frame</td>
</tr>
<tr>
<td>c.</td>
<td>Gussets - plates which connect cross braces to columns</td>
</tr>
<tr>
<td>d.</td>
<td>Stair stringers - side members which support stair treads</td>
</tr>
<tr>
<td>e.</td>
<td>Girder/Beam - the horizontal beam which carries loads and connects column to column</td>
</tr>
<tr>
<td>f.</td>
<td>Landing - the flat area between flights of stairs</td>
</tr>
</tbody>
</table>
Hand and power tools

Displayed below are common hand and power tools operated by a metal fabrication tradesperson.

![A] Hand drill<br>
![B] Straight shank twist drill bit<br>
![C] Hole saw bit<br>
![D] Electric sheet metal nibbler<br>

2. Write the letter that you consider corresponds to the description of that tool.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description (name)</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______</td>
<td>Electric sheet metal sheerer</td>
</tr>
<tr>
<td>_______</td>
<td>Electric angle grinder</td>
</tr>
<tr>
<td>_______</td>
<td>Electric hand drill (pistol drill)</td>
</tr>
<tr>
<td>_______</td>
<td>Straight shank twist drill bit</td>
</tr>
<tr>
<td>_______</td>
<td>Hole saw bit</td>
</tr>
<tr>
<td>_______</td>
<td>Electric jig saw</td>
</tr>
<tr>
<td>_______</td>
<td>Electric sheet metal nibbler</td>
</tr>
</tbody>
</table>

3. Circle the correct name of each hand tool illustrated below.

![a. Coping saw](image)  ![b. Grip clamp](image)  ![c. Double open end spanner](image)

a. i. Coping saw
    ii. Hack saw
    iii. Mortar and tannin saw
    iv. Sabre saw

b. i. Grip clamp
    ii. Multi grips
    iii. Plies grips
    iv. Self-locking pliers

i. Double open end spanner
   ii. Crow foot spanner
   iii. Double end ring spanner
   iv. Ratchet spanner
4. Micrometres are measuring devices that are used for accurate measurement to 0.01mm, choose the correct reading of the micrometre displayed underneath. (Circle the correct response)

a. 10mm  b. 10.05mm  c. 10.55mm  d. 10.5mm

Tabulation and chart reading

Gauges are used to hold high cylinder pressures to a constant adjustable working pressure. Metal Fabricators are required to read and set regulators pressures to the correct Gauge reading.

5. Referring to the gauge below, if the needle was pointing to ‘20’ on the outside scale, what would be the nearest inside scale reading? (Circle the correct response)

   a. 220  
   b. 240  
   c. 260  
   d. 280

6. The Tapping Chart shown is used to provide information on different threads and pitch types available as well as what size drill you are required to use to tap a thread.

   Referring to the chart, what is the drill size preferred for a M5 x 0.8 pitch thread? (Circle the correct response)

   a. 4.3mm  
   b. 3.8mm  
   c. 5.0mm  
   d. 4.5mm

<table>
<thead>
<tr>
<th>METRIC ISO COARSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
</tr>
<tr>
<td>mm</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>2.0</td>
</tr>
<tr>
<td>2.5</td>
</tr>
<tr>
<td>3.0</td>
</tr>
<tr>
<td>3.5</td>
</tr>
<tr>
<td>4.0</td>
</tr>
<tr>
<td>4.5</td>
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<tr>
<td>5.0</td>
</tr>
<tr>
<td>6.0</td>
</tr>
<tr>
<td>7.0</td>
</tr>
<tr>
<td>8.0</td>
</tr>
</tbody>
</table>
7. Read the following item about Personal Protective Equipment (PPE).

Personal protective clothing, overalls, hand protection and foot protection are often necessary and respiratory protective equipment may be required when dangerous gases and dusts are present. Personal Protective Equipment (PPE) includes clothing, equipment and substances designed to be worn by a person to protect them from risks of injury or disease.

PPE is only to be used in the workplace where it is not reasonably practicable to control hazards by other means.

The following information describes some PPE used to guard workers against specific hazards.

<table>
<thead>
<tr>
<th>Part of Body</th>
<th>Some Potential Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>Falling objects</td>
</tr>
<tr>
<td>Face &amp; Eyes</td>
<td>Sparks, ultraviolet light, metal shards, chemical splashes, fumes</td>
</tr>
<tr>
<td>Hearing</td>
<td>Excessive noise</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Dust, fumes, vapours</td>
</tr>
<tr>
<td>Hands</td>
<td>Abrasion, sparks, irritant substances, vibration, electric shock</td>
</tr>
<tr>
<td>Feet</td>
<td>Crushing, slipping, abrasion, irritant substances, wetness, electric shock, static electricity, puncture, cold/heat</td>
</tr>
</tbody>
</table>
Questions

a. Using an angle grinder can produce sparks that have the potential to damage eyes. What PPE could be used to guard against this hazard? (Note: there may be more than one PPE that can be used in this case).

b. If you are lifting heavy objects there is a risk of dropping the load on your feet. What PPE offers protection if this were to happen?

c. Some workplaces use chemical agents to maintain or clean equipment. What two PPE could be used to protect you from inhaling chemical fumes and prevent contact between the chemicals and your hands?

d. Some machinery operates at high noise levels. What PPE helps protect a worker’s hearing in these types of situations?
8. Metal Fabrication workers rely on drawings and plans as a way of assisting with communication. Drawings often display symbols and abbreviations so the drawing is not filled up with a lot of writing. Match the symbols and abbreviations in the correct order.

<table>
<thead>
<tr>
<th>Symbol or abbreviation</th>
<th>Correct Description for items</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Ø</td>
<td></td>
<td>Radius</td>
</tr>
<tr>
<td>b. PCD</td>
<td></td>
<td>Slope ratio and its direction</td>
</tr>
<tr>
<td>c. (758)</td>
<td></td>
<td>Diameter</td>
</tr>
<tr>
<td>d. R</td>
<td></td>
<td>Not to scale</td>
</tr>
<tr>
<td>e. 73 ± 0.5</td>
<td></td>
<td>Reference measurement</td>
</tr>
<tr>
<td>f. NTS</td>
<td></td>
<td>Pitch circle diameter</td>
</tr>
<tr>
<td>g. 1 [\frac{1}{5}]</td>
<td></td>
<td>Bilateral tolerance</td>
</tr>
</tbody>
</table>
9. From the chart below identify the dimensions for a 250mm Parallel Flange Channel (PFC).

<table>
<thead>
<tr>
<th>Designation</th>
<th>Mass per metre</th>
<th>Depth of Section</th>
<th>Flange Width</th>
<th>Flange Thickness</th>
<th>Web Thickness</th>
<th>Radius Root</th>
<th>Depth Between Flanges</th>
<th>$d_1$</th>
<th>($bt_w$)</th>
<th>Gross area of Cross Section</th>
<th>Coordinate of Centroid</th>
<th>Gauge line</th>
</tr>
</thead>
<tbody>
<tr>
<td>380 PFC</td>
<td>55.2</td>
<td>380</td>
<td>100</td>
<td>17.5</td>
<td>10</td>
<td>14.0</td>
<td>345</td>
<td>34.5</td>
<td>5.14</td>
<td>7030</td>
<td>27.5</td>
<td>55</td>
</tr>
<tr>
<td>300 PFC</td>
<td>40.1</td>
<td>300</td>
<td>90</td>
<td>16</td>
<td>8</td>
<td>14.0</td>
<td>268</td>
<td>33.5</td>
<td>5.13</td>
<td>5110</td>
<td>27.2</td>
<td>50</td>
</tr>
<tr>
<td>250 PFC</td>
<td>35.5</td>
<td>250</td>
<td>90</td>
<td>15</td>
<td>8</td>
<td>12.0</td>
<td>220</td>
<td>27.5</td>
<td>5.47</td>
<td>4520</td>
<td>28.6</td>
<td>50</td>
</tr>
<tr>
<td>230 PFC</td>
<td>25.1</td>
<td>230</td>
<td>75</td>
<td>12</td>
<td>6.5</td>
<td>12.0</td>
<td>206</td>
<td>31.7</td>
<td>5.71</td>
<td>3200</td>
<td>22.6</td>
<td>45</td>
</tr>
<tr>
<td>200 PFC</td>
<td>22.9</td>
<td>200</td>
<td>75</td>
<td>12</td>
<td>6</td>
<td>12.0</td>
<td>176</td>
<td>29.3</td>
<td>5.75</td>
<td>2920</td>
<td>24.4</td>
<td>45</td>
</tr>
<tr>
<td>180 PFC</td>
<td>20.9</td>
<td>180</td>
<td>75</td>
<td>11</td>
<td>6</td>
<td>12.0</td>
<td>158</td>
<td>26.3</td>
<td>6.27</td>
<td>2660</td>
<td>24.5</td>
<td>45</td>
</tr>
</tbody>
</table>

a. Identify the dimensions for a 250 mm Parallel Flange Channel:

\[ g = \text{________________________} \]
\[ d = \text{________________________} \]
\[ t_w = \text{________________________} \]
\[ r = \text{________________________} \]
\[ t_f = \text{________________________} \]
\[ b_f = \text{________________________} \]

b. Looking at the chart above and the diagram below what does the abbreviation “d” represent?

\[ \text{________________________} \]
Section 3: MATHMATICS

Numbers, measurement, scale, decimals, estimates & scientific notations

1. Work out the answers to these sums listed below.

<table>
<thead>
<tr>
<th>Addition</th>
<th>Subtraction</th>
<th>Multiplication</th>
<th>Division</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 1353</td>
<td>b. 238</td>
<td>c. 799</td>
<td>d. 12655</td>
</tr>
<tr>
<td>+ 447</td>
<td>+ 589</td>
<td>- 233</td>
<td>- 4356</td>
</tr>
<tr>
<td>237</td>
<td>905</td>
<td></td>
<td>x 7</td>
</tr>
<tr>
<td>1136</td>
<td>78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Calculate the mass weight of 14 lengths of designated 310 UC (universal column), each with a mass of 198 Kg/m x 5.450 m long.

Formula = (Mass per metre x Length x Quantity)

Mass = Kg/m x Length (m) x Quantity = Answer

Mass = ___________________________ = _________

3. You are required to calculate the total mass weight of an order of 9 lengths of 200 Parallel Flange Channel (PFC), each with a mass of 22.9 Kg/m and length of 3450 mm

Formula = QTY x Mass weight of material x Length (m)

Mass = 9 x 22.9Kg/m x 3.45 m

Answer (total mass weight in Kg) = ________________

4. What is the adjacent angle of a right angle triangle when you have a slope ratio of 1:1? (Circle the correct answer)

a. 180°

b. 60°

c. 30°

d. 45°
5. What is the average of these numbers 20, 11, 37, 42 & 28?

Average = ________________

6. Using the formula given, calculate a $\frac{1}{12}$ segment of a pipe where the pipe diameter is 150mm.

Formula = Dia $\times \pi$ $\div$ required segment where $\pi = 3.1416$

Cir/Seg of $\frac{1}{12}^{th}$ = $150 \times 3.1416$ $\div$ 12

Answer = ________________ mm

7. What would these fractions be if you were to divide them by 2?

a. $\frac{1}{4} = \underline{\hspace{1cm}}$

b. $\frac{1}{2} = \underline{\hspace{1cm}}$

c. $\frac{1}{8} = \underline{\hspace{1cm}}$

d. $\frac{3}{4} = \underline{\hspace{1cm}}$
Section 4: PROBLEM SOLVING

1. How many 6 metre lengths of 32 NB (nominal bore) diameter pipe will be required to get 88 pieces if each piece is to be 533 mm long?

2. A building has 82 columns with each column requiring 68 high tensile bolts. Each bag of bolts contains 40 bolts.
   a. How many bags will be required?
   b. If no bolts are damaged or lost how many bolts will be left?

3. What is the area of the steel plate which has a size 2.478 metres long and 5.65 metres wide?

4. Calculate the mass of a plate 2.560 metres x 1.225 metres x 25mm thick. The mass of a steel plate 1 metre square x 1mm is 7.85 kg.

5. Calculate the hole pitch for 28 holes around a 2.4 metres Pitch Circle Diameter (PCD), where \( \pi = 3.1416 \).
   
   Formula to use: \[
   \text{Pitch} = \frac{\text{PCD} \times \pi}{\text{Number of holes}}
   \]

6. What is the volume of a rectangular tank having an inside measurement of 788mm long 455mm wide and 256 mm high?
7. Establish the size of the following X° angles by circling the appropriate answer from the list below.

   a.  
      
   b.  

   i) 37.5°  
   ii) 42.5°  
   iii) 47.5°  
   iv) 52.5°  

   i) 42.5°  
   ii) 45°  
   iii) 47.5°  
   iv) 50°  

8. Calculate the volume of this cylinder using the inside diameter measurement. Use \( \pi = 3.1416 \).

   Formula \( = \pi r^2 \times \text{length} \) = 

   \[ \text{ID} \ \varnothing 1.78 \text{ mm} \]

9. Calculate the area of this triangle using the following formula:

   \[
   A = \frac{\text{Base} \times \text{Height}}{2}
   \]

   \[ A = \quad \]

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10. What is the diagonal of a triangle having sides measuring \(A = 2.5\) metres x 
\(B = 1.85\) metres?

Formula: \[C = \sqrt{A^2 + B^2}\]

\[\begin{array}{c}
1.85 \\
2.5 \\
\end{array}\]

Answer: ________________

11. What are the lengths of segments (A) and (B) in the diagram below? All dimensions are in mm.

\[\begin{array}{c}
275 \\
115 \\
B \\
115 \\
390 \\
A \\
A \\
\end{array}\]

\[\begin{array}{c}
A = \\
B = \\
\end{array}\]

12. Looking at the diagram below, six holes are to be drilled at an equal distance apart. Complete the sequence by determining the dimension of (A). All dimensions are in mm.

\[\begin{array}{c}
50 \\
125 \\
A \\
275 \\
350 \\
425 \\
\end{array}\]

Answer: ________________
ANSWERS

Section 1: LITERACY, READING AND COMPREHENSION

1. a. Addresses
    Welders
    Fixes
    Lunches
    Finishes

   b. Doctor
    Wednesday
    January
    Millimetres
    Laugh out loud

2. Acetylene
   Argon
   Carbon dioxide
   Helium
   Hydrogen
   LPG (liquid petroleum gas)
   Nitrogen
   Oxygen

3. Paragraph 1
   Paragraph 2
   Paragraph 3
   metal
   person
   have
   some
   physical
   trade
   employer
   advancing
   skills
   for
   safely
   knowledge
   learn
   read
   such
   tradesperson
   industrial
   interest
   through
   and
   what

4. a. ii) Oxygen Acetylene and Oxygen-LPG (Liquefied petroleum gas)
   b. iv) 815°C
   c. iv) Heated Iron and a pure Oxygen jet
   d. iii) Ignition temperature

Section 2: SPECIFIC KNOWLEDGE

1. a. 3 = Base plate - welded to the base of the column member and secured to the footing
   b. 1 = Column - vertical support member of a building frame
   c. 4 = Gussets - plates which connect cross braces to columns
   d. 6 = Stair stringers - side members which support stair treads
   e. 2 = Girder/Beam - the horizontal beam which carries loads and connects column to column
   f. 5 = Landing - the flat area between flights of stairs

2. G = Electric sheet metal sheerer
   A = Electric angle grinder
   C = Electric hand drill (pistol drill)
   B = Straight shank twist drill bit
   D = Hole saw bit
   E = Electric jig saw
   F = Electric sheet metal nibbler

3. a. ii) Hack saw
   b. iv) Self-locking pliers
   c. iii) Double end ring spanner
4. b. 10.05mm
5. d. 280
6. a. 4.3 mm tapping drill size
8. a. $\varnothing$ = Diameter  
b. PCD = Pitch circle diameter  
c. (758) = Reference measurement  
d. R = Radius  
e. 73 ± 0.5 = Bilateral tolerance  
f. NTS = Not to scale  
g. 1[5/5] = Slope ratio and its direction
9. a. g = 50mm  
d = 250mm  
tw = 8mm  
r = 12.0mm  
 tf = 15mm  
 bf = 90mm  
b. Depth of section

Section 3: MATHEMATICS
1. a. 3173  b. 1810  c. 566  d. 8299  e. 4053  
f. 17115.5
2. 15,107.4Kg
3. 711.045 Kg
4. d. 45°
5. Average = 27.6
6. 39.27mm
7. a. $\frac{1}{4} \div 2 = \frac{1}{8}$  
b. $\frac{1}{2} \div 2 = \frac{1}{4}$  
c. $\frac{1}{8} \div 2 = \frac{1}{16}$  
d. $\frac{3}{8} \div 2 = \frac{3}{16}$

Section 4: PROBLEM SOLVING
1. 8 lengths of 6 metre 32 Ø NB pipe
2. a. 140 bags  b. 24 bolts
3. 14 m²
4. 615.44 kg.
5. 0.2689 m
6. 91,786,240 mm³
7. a. ii. 42.5°  b. ii. 45°
8. 31.106 mm³
9. 17625 mm²
10. C = 3.11 m
11. A = 57.5 mm  B = 22.5 mm
12. 200 mm
Contributions

This Practice Aptitude Quiz was developed by:

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