



Australian Government

A U S T R A L I A N
A P P R E N T I C E S H I P S

Your Life. Your Career. Your Future.

Metal Fabrication

Practice Aptitude Quiz

Practice Aptitude Quiz

Part 1: About this quiz

Use this quiz to prepare for an Apprenticeship in Metal Fabrication

This quiz:

- Is NOT a formal assessment tool or pre-requisite for any job application
- Shows key learning standards for the Metal Fabrication industry
- Has been developed with the help of industry leaders, TAFE and high schools

Quiz details

This quiz will:

- Take approximately 90 minutes to complete
- Ask you numeracy and literacy questions specific to the Metal Fabrication industry
- Assess your literacy and numeracy at a Year 11 standard
- Allow you to use a calculator
- Share correct answers at the end

Who should take this quiz?

You should complete this quiz if you:

- Are thinking about starting an Apprenticeship in the Metal Fabrication industry
- Want to practise for a formal aptitude test

Need help with your literacy and numeracy skills?

If you want to improve your literacy and numeracy skills, reach out to any of the below:

- Australian Apprenticeship Support Network providers
- Your Registered Training Organisation when you start training
- Reading Writing Hotline:
1300 655 506
www.readingwritinghotline.edu.au
- Careers advisers and your teachers (if you're in high school)

More information about the Metal Fabrication industry

Visit www.yourcareer.gov.au/industries/c/manufacturing

On this page you'll be able to:

- See the most popular Metal Fabrication industry occupations
- Get general information and statistics about the industry
- Search for Metal Fabrication industry courses

Practice Aptitude Quiz

How to use this quiz

This is an interactive form that can be filled out on your computer.

You can either:

- Fill it out on your computer; OR
- Print it out; OR
- Write your answers down on paper as you go.

Use the answers section at the end of the quiz to see how you went.

How to complete this quiz on your computer

1. Download and save the quiz onto your computer
2. Open the file from your computer
3. Fill in the form using a keyboard and mouse

Practice Aptitude Quiz

Part 2: The Quiz

Section 1: Language and Literacy

1. Change these following words into plurals:

Address _____

Welder _____

Fix _____

Lunch _____

Finish _____

2. Write these abbreviated words in full:

Dr. _____

Wed _____

Jan _____

mm _____

LOL _____

3. 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

Practice Aptitude Quiz

4. Read the following text. In each paragraph, there are seven spelling or grammar 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, and you can operate in challenging environments and keep up with 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.

Paragraph 1	Paragraph 2	Paragraph 3

Practice Aptitude Quiz

5. Read the following passage 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 equipment 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, and 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.

- a. For flame cutting/gouging the most common gas combinations used are:

Helium Oxygen and Carbon Dioxide gases

Oxygen and Acetylene or Oxygen & LPG

Oxygen, Carbon Dioxide and Hydrogen gases

Hydrogen Carbon Dioxide and Argon gases

- b. The flame cutting of steel depends on a chemical reaction known as oxidisation. This reaction occurs between:

Heated pure Oxygen jet and Carbon

Heated steel and Acetylene gas

Heated iron and LP gas

Heated Iron and a pure Oxygen jet

Practice Aptitude Quiz

c. The temperature oxidation occurs at is known as:

Oxidation temperature

Melting temperature

Ignition temperature

Burning temperature

d. The ignition temperature at which oxidation occurs is:

723° C

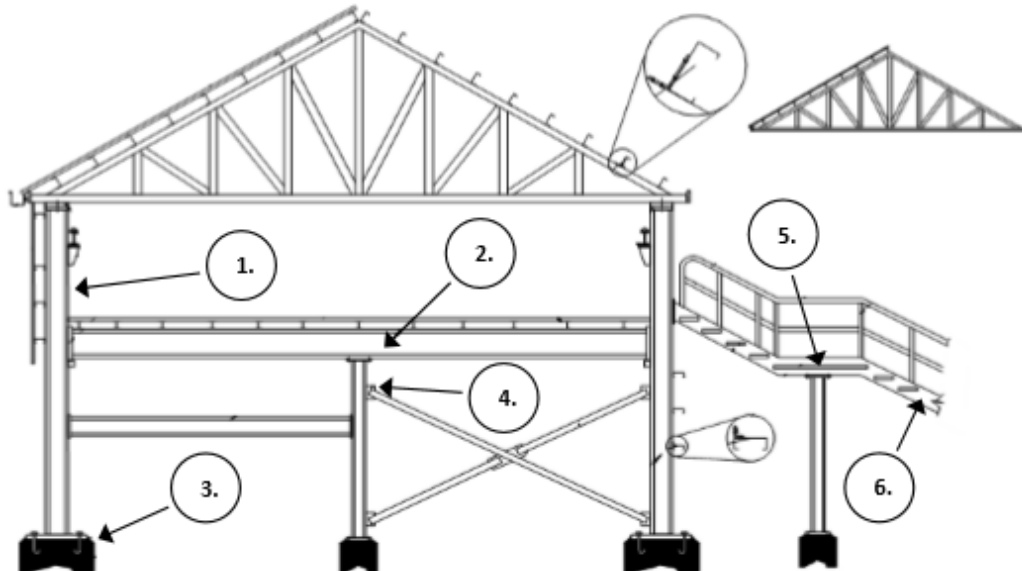
1450° C

950° C

815° C

Practice Aptitude Quiz

Section 2: General 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 the correct description of that building component:

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

Practice Aptitude Quiz

Hand and power tools

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



2. Write the letter that corresponds to the description of that tool:

Letter	Name/Description
_____	Electric sheet metal shearer
_____	Electric angle grinder
_____	Electric hand drill (pistol drill)
_____	Straight shank twist drill bit
_____	Hole saw bit
_____	Electric jig saw
_____	Electric sheet metal nibbler

Practice Aptitude Quiz

3. Select the correct name of each hand tool illustrated below:



Coping saw

Grip clamp

Double open end spanner

Hack saw

Multi grips

Ratchet spanner

Sabre saw

Self-locking pliers

Double end ring spanner

4. Micrometres are measuring devices that are used for accurate measurement to 0.01 mm, choose the correct reading of the micrometre displayed underneath. Select the correct response:



10 mm

10.05 mm

10.55 mm

10.5 mm

Practice Aptitude Quiz

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?



- 220
- 240
- 260
- 280

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.

6. Referring to the chart, what is the drill size preferred for a 5 mm x 0.8 mm pitch thread? Select the correct response.

Metric ISO Coarse			
Diameter	Pitch	Tapping drill sizes	
		Preferred	Alternative
mm	mm	mm	mm
2.00	0.40	1.65	1.60
2.50	0.45	2.10	2.05
3.00	0.50	2.55	2.50
3.50	0.60	2.95	2.90
4.00	0.70	3.40	3.30
4.50	0.75	3.80	3.70
5.00	0.80	4.30	4.20
6.00	1.00	5.10	5.00
7.00	1.00	6.10	6.00
8.00	1.25	6.90	6.80

- 4.3 mm
- 3.8 mm
- 5 mm
- 4.5 mm

Practice Aptitude Quiz

7. Read the following item about Personal Protective Equipment (PPE):

Personal protective clothing, hand protection, foot protection and respiratory protective equipment are often necessary in the Metal Fabrication sector.

Personal Protective Equipment (PPE) includes clothing, equipment and substances designed to be worn or used to protect people 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.

Gloves



Photo A

Breathing Mask



Photo B

Goggles



Photo C



Sign A



Sign B



Sign C



Sign D

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

Practice Aptitude Quiz

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 could be used to help prevent injuring your feet?

- 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?

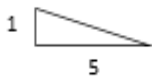
- d. Some machinery operates at high noise levels. What PPE can help to protect a worker's hearing in these types of situations?

Practice Aptitude Quiz

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 with the correct descriptions:

Descriptions:

- Radius
- Slope ratio and its direction
- Diameter
- Not to scale
- Bilateral tolerance
- Pitch circle diameter
- Reference measurement

	Symbol or abbreviation	Correct Description for items
a.	\varnothing	
b.	PCD	
c.	(758)	
d.	R	
e.	73 ± 0.5	
f.	NTS	
g.		

Practice Aptitude Quiz

9. The chart below records the dimensions and properties of varying Parallel Flange Channels (PFC):

Parallel Flange Channels – Dimensions and Properties												
Designation	Mass per metre kg/m	Depth of section d mm	Flange		Web thickness t_w mm	Radius Root R mm	Depth between flanges d_1 mm	D1 t_w	(Bt _w) t_x	Gross area of cross section A_g Mm ²	Coordinate of centroid X_1 mm	Gauge line g mm
			Width b_f mm	Thickness t_f mm								
380	55.2	380	100	17.5	10	14	345	34.5	5.14	7030	27.5	55
300	40.1	300	90	16	8	14	268	33.5	5.13	5110	27.2	50
250	35.5	250	90	15	8	12	220	27.5	5.47	4520	28.6	50
230	25.1	230	75	12	6.5	12	206	31.7	5.71	3200	22.6	45
200	22.9	200	75	12	6	12	176	29.3	5.75	2920	24.4	45
180	20.9	180	75	11	6	12	158	26.3	6.27	2660	24.5	45

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

g _____

d _____

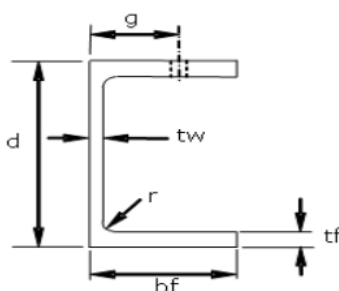
t_w _____

R _____

t_f _____

b_f _____

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



Practice Aptitude Quiz

Section 3: Numeracy

Calculators may be used

1. Evaluate the following:

a. $1353 + 447 + 237 + 236 + 1136$

b. $238 + 589 + 905 + 78$

c. $799 - 233$

d. $12655 - 4356$

e. 579×7

f. a. $68462 \div 4$

2. Using the formula below, 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

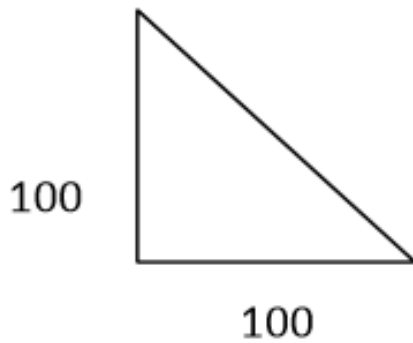
3. Using the formula below, calculate the total mass weight of an order of 9 lengths of 200 Parallel Flange Channel (PFC), each with a mass of 22.9 Kg/m and length of 3450 mm:

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

Mass = 9 x 22.9Kg/m x 3.45 m

Practice Aptitude Quiz

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



- 30°
- 45°
- 60°
- 180°

5. Calculate the average of these numbers: 20, 11, 37, 42, 28

6. Using the formula given, calculate a 1/12 segment of a pipe where the pipe diameter is 150 mm.

Formula = Dia x π \div required segment where $\pi = 3.1416$

Cir/Seg of 1/12th = 150 x 3.1416 \div 12

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

- a. $\frac{1}{4}$

- b. $\frac{1}{2}$

- c. $\frac{1}{8}$

- d. $\frac{3}{8}$

Practice Aptitude Quiz

8. 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?

9. 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?

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

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

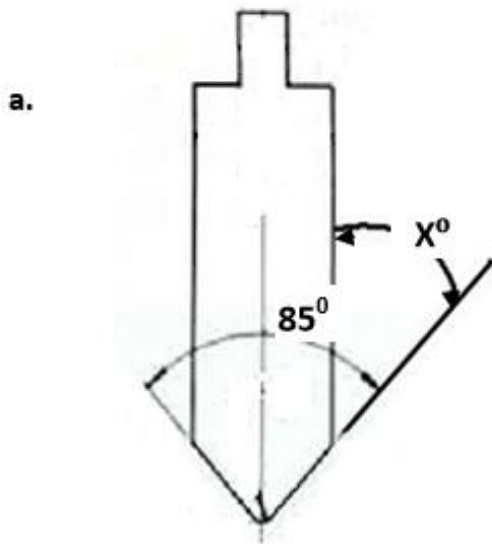
12. Calculate the hole pitch for 28 holes around a 2.4 metres Pitch Circle Diameter (PCD), where $\pi = 3.1416$:

$$\text{Formula to use:} \quad \text{Pitch} = \frac{\text{PCD} \times \pi}{\text{Number of holes}}$$

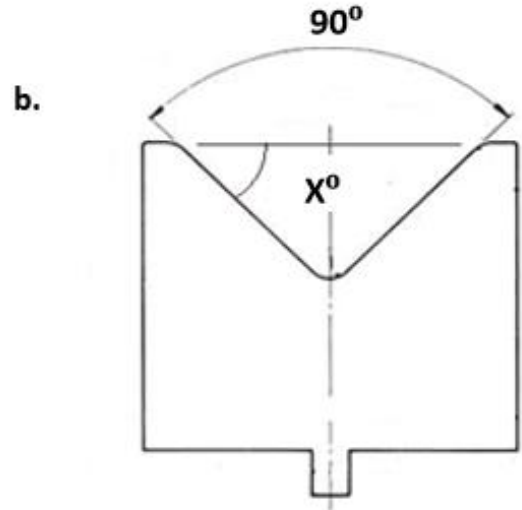
13. What is the volume of a rectangular tank having an inside measurement of 788 mm long 455 mm wide and 256 mm high?

Practice Aptitude Quiz

14. Establish the size of the following X° angles by selecting the appropriate answer from the list below:

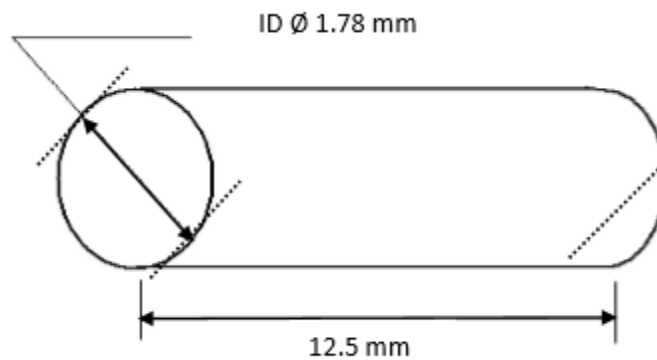


- 37.5°
- 42.5°
- 47.5°
- 52.5°



- 42.5°
- 45°
- 47.5°
- 50°

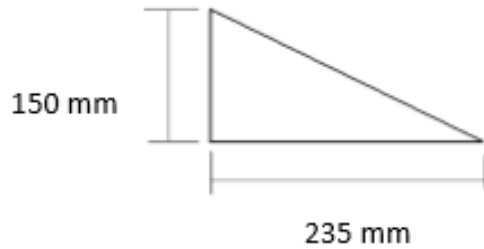
15. Calculate the volume of this cylinder using the inside diameter measurement. Use $\pi = 3.1416$.



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

Practice Aptitude Quiz

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

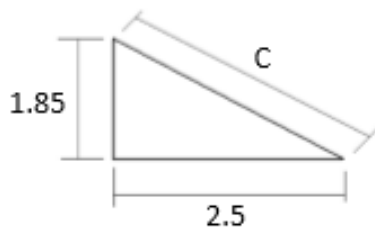


$$A = \frac{\text{Base} \times \text{Height}}{2}$$

17. What is the diagonal length of a triangle having sides measuring:

A = 2.5 metres x B = 1.85 metres?

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

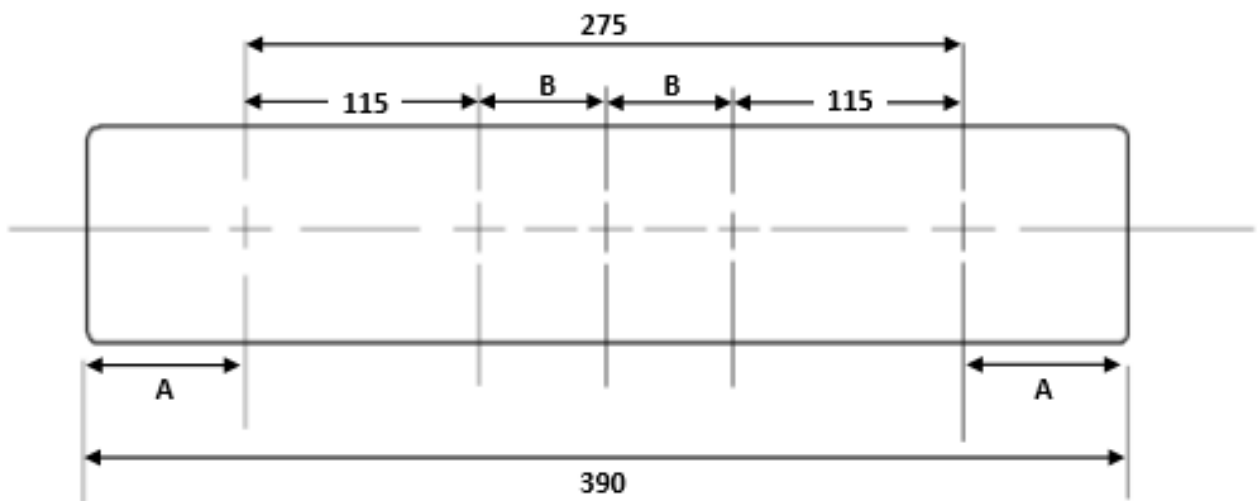


Practice Aptitude Quiz

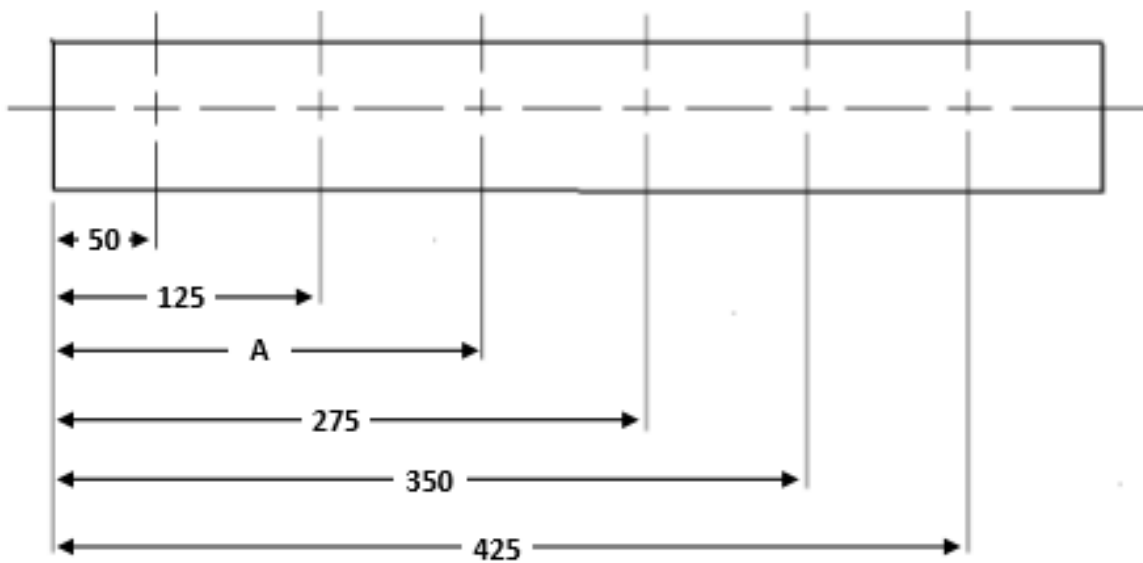
18. What are the lengths of segments (A) and (B) in the diagram below? All dimensions are in mm:

A. _____

B. _____



19. 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.



Practice Aptitude Quiz

ANSWERS

Section 1: Language and Literacy

- Addresses
Welders Fixes
Lunches
Finishes
- Doctor
Wednesday
January
Millimetre
Laugh out loud

3.

Acetylene
Argon
Carbon dioxide
Helium
Hydrogen
LPG (Liquid Petroleum Gas)
Nitrogen
Oxygen

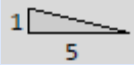
- 4.
- | Paragraph 1 | Paragraph 2 | Paragraph 3 |
|--------------|-------------|-------------|
| metal | person | have |
| some | physical | trade |
| employer | advancing | skills |
| for | safety | knowledge |
| learn | read | such |
| tradesperson | industrial | interest |
| through | and | what |

- 5.
- Oxygen and Acetylene or Oxygen-LPG
 - Heated Iron and a pure Oxygen jet
 - Ignition temperature
 - 815°C

Section 2: General Knowledge

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

Practice Aptitude Quiz

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. Hack saw b. Self-locking pliers c. Double end ring spanner
4. 10.05 mm
5. 280
6. 4.3 mm tapping drill size
7. a. Photo C and Sign C b. Sign B c. Photo A and Photo B d. Sign D
8. a. Ø = 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.  = Slope ratio and its direction
9. a. g = 50 mm
d = 250 mm
tw = 8 mm
R = 12.0 mm
tf = 15 mm
bf = 90 mm
b. Depth of section

Section 3: Numeracy

1. a. 3409 b. 1810 c. 566 d. 8299 e. 4053 f. 17115.5
2. 15,107.4 Kg
3. 711.045 Kg
4. 45°
5. 27.6
6. 39.27 mm
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. $\frac{3}{8} \div 2 = \frac{3}{16}$

Practice Aptitude Quiz

8. 8 lengths of 6 metre 32 Ø NB pipe
9. a. 140 bags b. 24 bolts
10. 14 m²
11. 615.44 kg
12. 0.26928 m
13. 91,786,240 mm³
14. a. 42.5° b. 45°
15. 31.106 mm³
16. 17625 mm²
17. C = 3.11 m
18. A = 57.5 mm B = 22.5 mm
19. 200 mm