

# ATC Program Essential Skills Package

## Plumbing Trades



ARTS & TECHNOLOGY  
C E N T R E

**Instructional Methods:** Classroom Lectures, Practical Lab Activities, and ....

**Course Format:** Classroom: Individual and group work

Lab: Individual and group work (practical application)

### **Rationale:**

Workplace Education Manitoba has listed 9 Essential Skills to be successful in any work place. All nine Essential Skills are used in different combinations, in different applications, in every occupation. They are the foundational skills you use to carry out your work tasks and they're the building blocks you use to learn new ones. The importance of - and need for - employees to have appropriate levels of workplace Essential Skills is clear and strong.

What specifically are the Essential Skills needed in the workplace?

To help answer this question, the federal government, since 1994, has surveyed more than 3000 Canadians in workplaces in all sectors and of all types and sizes of organizations. All were asked what workplace Essential Skills they felt were needed in order for workers to be most effective, efficient and productive.

### **The result has been the identification of the following nine workplace Essential Skills:**

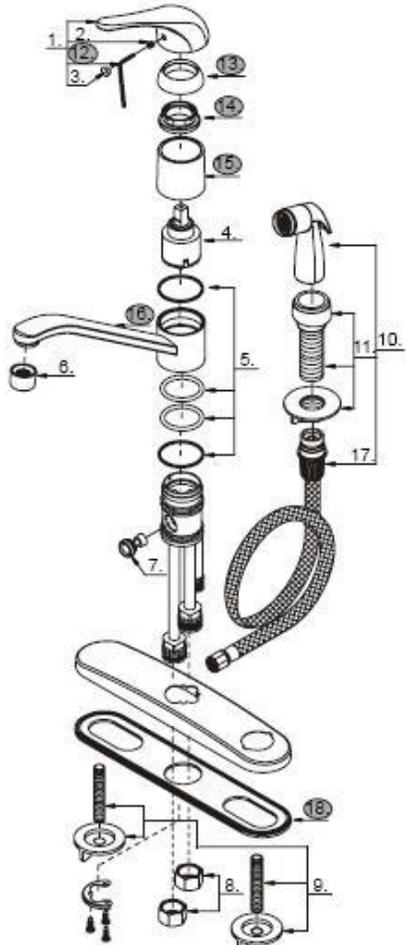
1. Reading
2. Writing
3. Numeracy
4. Document Use
5. Oral Communication
6. Working With Others
7. Thinking
8. Computer Use
9. Continuous Learning

To help students be successful in their training, ATC has developed a package focused specifically on these Essential Skills and how they apply to the program of ***Plumbing Trades Program***. The purpose of this package is not to dissuade students from attending the program, but to help them become successful by informing them of the skills required. We highly encourage all students to take some time to work through the package and become informed of the program requirements.

## Reading

- Read brochures from suppliers to find information on materials.
- Read health and safety notices.
- Read and follow product installation procedures.
- Read Material Safety Data Sheets (MSDS) to obtain information about hazardous products.
- Read manuals to install, repair and maintain plumbing systems.
- Read trade text books to understand the science related to plumbing, such as the properties of water, metals and alloys.
- Read the Canadian Plumbing Code to follow the regulations on plumbing systems.

**Reading Example #1:** Below is a parts manual for a glacier bay single lever kitchen faucet, you must be able to identify the worn part and order the replacement using part name and part number.



Part Name	Part # # de pièce # de Parte
1° Handle Assembly	0098041
2. Screw (M5 * 5mm L)	0092141
3. Handle Cap	0092146
4. Ceramic Disc Cartridge	0092298
5. Washer & O-ring Set	0093073
6° Aerator	0093316
7. Spray Diverter w/ Check Valve	0094040
8. Supply Nut	0097819
9. Mounting Hardware	0097902
10° Spray Assembly	0094111
11° Spray Holder Assembly	0098160
12. Hex Wrench (2.5mm)	A031000
13° Trim Cap	A103116
14. Retainer Nut	A104002
15° Sleeve	A041026
16° Spout	A100009N
17. Spray Hose	0093157
18. Putty Plate	A011305

40-120 Less Spray, 3 Hole/ Sans douchette, 3 trous/ Menos rociador, 3 agujeros  
 40-121 Spray In Escutcheon, 3 Hole/ Douchette dans l'applique, 3 trous/ Rociador en la base, 3 agujeros  
 40-122 With Spray, 4 Hole/ Avec douchette, 4 trous/ Con Rociador, 4 agujeros

**What is the Spouts number, part name and Part #? - #16/ A100009N**



# MATERIAL SAFETY DATA SHEET

## Metal Cleaner

Page: 1

HEALTH	3
FLAMMABILITY	1
PHYSICAL HAZ.	1
PPE	n

Revision: 11/27/1996

Printed: 12/01/2003

Date Created: 12/09/1996

### 1. Product and Company Identification

**Product Code:** DX579  
**Product Name:** Metal Cleaner  
**Manufacturer Name and Address**  
**Company Name:** PPG Industries, Inc.  
 4325 Rosanna Drive  
 P.O. Box 9  
 Allison Park, PA 15101  
**Emergency Contact 1**  
**Information Contact** Emergency Medical/Spill Info: (304)842-1300  
 Technical Information (614)363-9610  
**Chemical Family:** ACID

### 2. Composition/Information on Ingredients

Hazardous Components (Chemical Name)	CAS #	Percentage	OSHA TWA	ACGIH TWA	Other Limits
1. Ethanol, 2-Butoxy-	111-76-2	10.0 -20.0 %	(S) 25 ppm	(S) 25 ppm	No data.
2. Diethylene glycol monobutyl ether	112-34-5	10.0 -20.0 %	Not Estab.	Not Estab.	No data.
3. Phosphoric acid	7664-38-2	30.0 - 40.0 %	1 mg/m3	1 mg/m3	No data.

### 3. Hazards Identification

#### Emergency Overview

Harmful or fatal if swallowed. May be corrosive. This product contains a material which causes skin burns. This product contains a material which causes irreversible eye damage. May be harmful if absorbed through the skin. Vapor and/or spray mist harmful if inhaled. Vapor irritates eyes, nose, and throat. Vapor generated at elevated temperatures irritates eyes, nose, and throat.

**Route(s) of Entry:** Inhalation? No Skin? No Eyes? No Ingestion? No

#### Potential Health Effects (Acute and Chronic)

**INGESTION:** Harmful or fatal if swallowed.

**EYE CONTACT:** This product contains a material which causes irreversible eye damage.

**SKIN CONTACT:** May be corrosive. This product contains a material which causes skin burns. May be harmful if absorbed through the skin.

**INHALATION:** Vapor and/or spray mist harmful if inhaled. Vapor irritates eyes, nose, and throat. Vapor generated at elevated temperatures irritates the eyes, nose, and throat. Repeated exposure to high vapor concentrations may cause irritation of the respiratory system and permanent brain and nervous system damage.

**CHRONIC OVEREXPOSURE:** Avoid long-term and repeated contact. This product contains an ethylene series glycol ether and/or acetate which has been shown to cause adverse effects on the kidneys, liver, blood and/or blood-forming tissue. This product contains diethylene glycol monobutyl ether (DEGBE). DEGBE consumed in drinking water at low levels by rats for 30 days caused injury to either the liver, kidney, spleen, or testes.

## Plumbing Code Questions:

1. The minimum size cleanout (CO) for the building is?
  - a. 50 mm
  - b. 75 mm
  - c. 100 mm
  - d. Same as building drain
  
2. The minimum size building sewer is?
  - a. 50 mm
  - b. 75 mm
  - c. 100 mm
  - d. Same as building drain
  
3. The minimum slope a trap arm must be graded is?
  - a. 1%
  - b. 2%
  - c. 3%
  - d. 4%
  
4. Piping that is placed underground by the Plumber must be covered with a minimum of \_\_\_\_\_ mm of granular material, then carefully placed and tamped over the pipe.
  - a. 100
  - b. 200
  - c. 300
  - d. 400
  
5. The minimum size of main stack required in a single –family home is?
  - a. 2"
  - b. 3"
  - c. 4"
  - d. Same size as the building sewer
  
6. No water closet may be installed in a room that is not properly lighted and ventilated.
  - a. True
  - b. False

7. When determining the location of the main plumbing stack, what should be considered:

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8. Structural members can be compromised to accommodate plumbing in a building.

- a. True
- b. False

9. The minimum size vent required that serves a water closet is \_\_\_\_\_"/  
\_\_\_\_\_mm.

- a. 1.25/32
- b. 1.50/40
- c. 2/50
- d. 3/75

10. The maximum size of trap arm that may drain into a wet vent is \_\_\_\_\_ mm, with the exception of an emergency floor drain.

- a. 32
- b. 40
- c. 50
- d. 75

11. A 2" trap arm that is installed with a 4% grade will have a maximum developed length of?

- a. 2'-0"
- b. 4'-0"
- c. 5'-0"
- d. 6'-0"

12. When planning the path or route to the main plumbing stack, what should you always consider before installation?

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## Numeracy

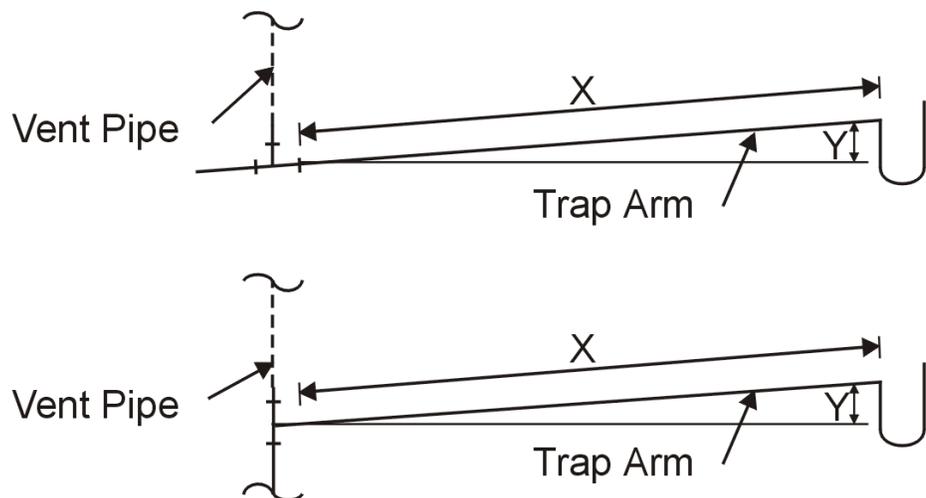
- Measure to locate and mark positions for pipe connections.
- Compare pressure gauge readings and manufacturers' standards when installing gas pipes underground.
- Schedule daily activities to complete assigned tasks.
- Estimate the time and quantity of materials needed to complete a project.
- Adjust schedules to coordinate work with other tradespersons.
- Make calculations using formulae, such as determining the total fall on a drain line.
- Prepare invoices based on hourly labor rates, cost of materials and taxes.
- Make calculations using trigonometric constants based on the angle of elbows.

**Numeracy Examples:** Plumbers need to know how to use plumbing code regulations to calculate appropriate grade in reference to trap arms, fixture drains and building drains.

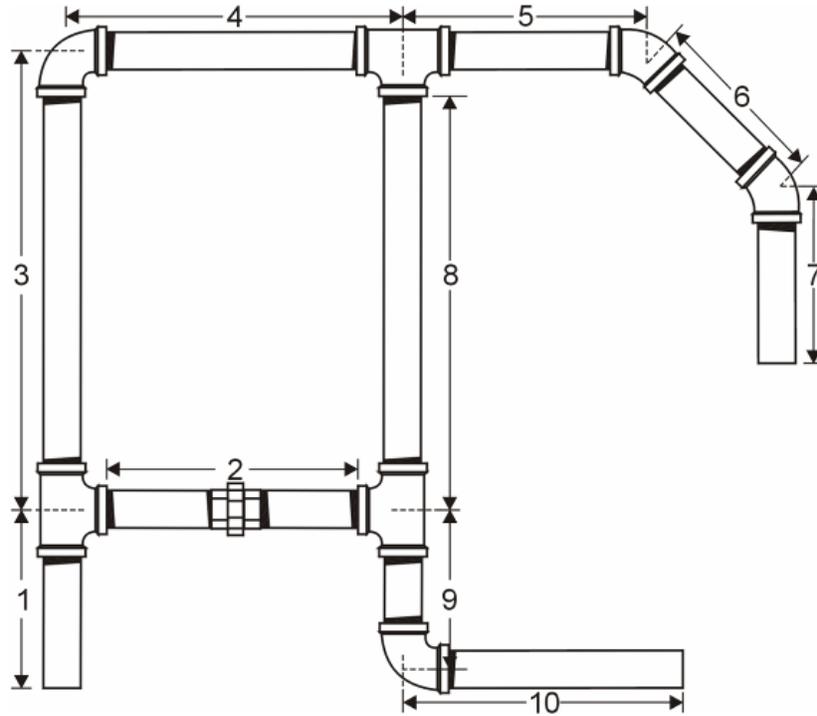
Size of Trap Served, Inches	Maximum Length of Trap Arm, m	Minimum Slope
1 <sup>1</sup> / <sub>4</sub>	1.5	1/50
1 <sup>1</sup> / <sub>2</sub>	1.8	1/50
2	2.4	1/50
3	3.6	1/50
4	4.8	1/50
4	9.8	1/100

The minimum developed length "X" of a trap arm is 2 pipe diameters

*Plumbers need to know how to calculate appropriate minimum or maximum developed length for "X" and maximum fall "Y" in reference to trap arms.*



Plumbers also need to be able to calculate end to end measurements for threading iron pipe and fittings using tables from ITP handbook



Measured Pipe Length in Imperial	Pipe Section Number	End to End Measurement in Imperial
10"	1	
	2	
3' 10 <sup>1</sup> / <sub>2</sub> "	3	
2' 6"	4	
18 <sup>1</sup> / <sub>4</sub> "	5	
11 <sup>3</sup> / <sub>8</sub> "	6	
1' 0"	7	
	8	
6 <sup>3</sup> / <sub>4</sub> "	9	
23 <sup>1</sup> / <sub>2</sub> "	10	

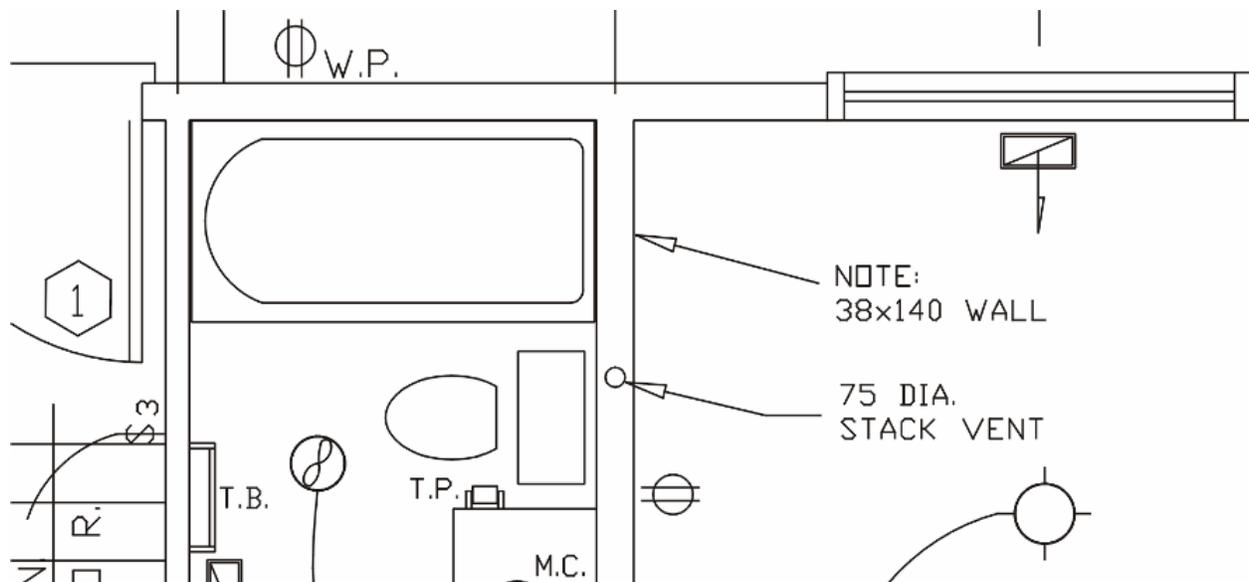
Imperial	Throw	Thread Engagement	Fitting Allowance
90° ELL	1 <sup>3</sup> / <sub>4</sub> "	1 <sup>1</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "
45° ELL	1 <sup>5</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "	5/8"
TEE	1 <sup>3</sup> / <sub>4</sub> "	1 <sup>1</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "
Size of Line = 1 <sup>1</sup> / <sub>4</sub> " Imperial			

Can you calculate the length of pipe required for pipe section number 6?

## Document use

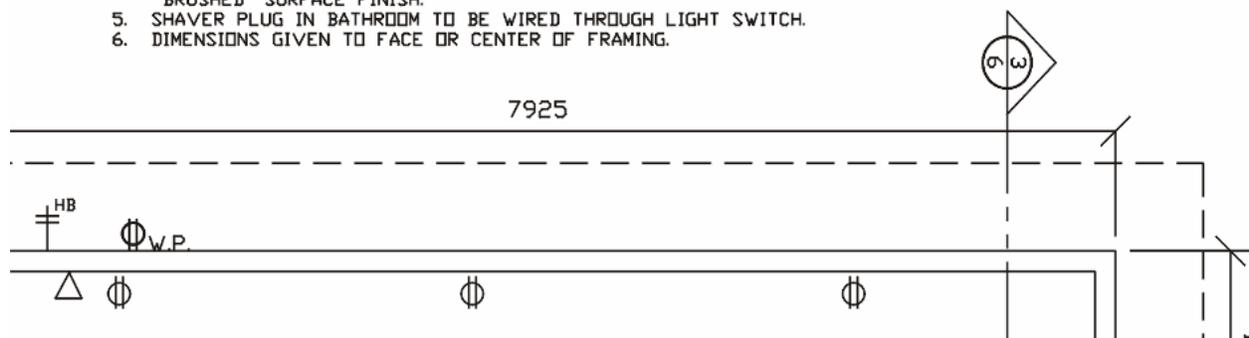
- Read notes in daily log books to track work in progress.
- Read assembly drawings to install fixtures and appliances.
- Interpret diagrams in the Canadian Plumbing Code to ensure that the capacity of a building's venting systems complies with regulatory requirements.
- Interpret schematics to trace the circuit for gas flow when planning for the installation of piping.
- Interpret drawings to find municipal connections or water sources and to plan the routing of pipe when installing water services.
- Interpret blueprints to find the locations of piping and catch basins for drainage systems.

**Document Examples:** Plumbers must use drawings to determine appropriate plumbing drainage, venting and water supply routes.



### GENERAL NOTES:

1. LOCATION OF RETURN AIR GRILLES TO BE DETERMINED BY MECHANICAL CONTRACTOR.
2. FOR 'DOOR SCHEDULE', SEE DWG 'A7'.
3. ALL LINTELS OVER WINDOWS TO BE 2-38x235 UNLESS OTHERWISE NOTED. MEMBERS TO BE PROVIDED WITH CENTRE BLOCKING TO OBTAIN FULL WIDTH OF EXTERIOR WALL.
4. POURED IN PLACE CONCRETE WALKWAY 100mm DEEP, OVER 150 DEEP BED OF COMPACTED GRAVEL BASE. WALKWAY TO HAVE 3 EQUALLY SPACED CONTROL JOINTS AND A 'BRUSHED' SURFACE FINISH.
5. SHAVER PLUG IN BATHROOM TO BE WIRED THROUGH LIGHT SWITCH.
6. DIMENSIONS GIVEN TO FACE OR CENTER OF FRAMING.



## **Oral communication**

- Talk to suppliers about the availability of parts.
- Communicate with other tradespersons on a job site to coordinate work and discuss potential problems.
- Communicate with a foreperson to receive job assignments.
- Talk to suppliers to troubleshoot system problems.
- Talk to customers who may be agitated or concerned.

## **Working with others**

- Coordinate with other plumbers and tradespersons on a job site to determine the order in which various work tasks should be completed.
- Participate in discussions about work processes or product improvement.
- Demonstrate how to perform tasks to other workers.
- Orient or train new employees.
- Communicate with customers, suppliers and management.

## **Thinking**

- Decide on priorities for service calls, repairs and scheduled work.
- Contact mechanical engineers, suppliers and manufacturers to clarify installation instructions.
- Identify and solve problems, such as correcting repairs done by inexperienced homeowners.
- Determine the most cost-effective way to use materials and supplies.
- Find and interpret specific clauses in construction contracts or service agreements.
- Decide how to install large and heavy plumbing systems with the available personnel and equipment.
- Resolve a backflow problem with a sewer.
- Work with other tradespersons on a job site to plan work schedules.

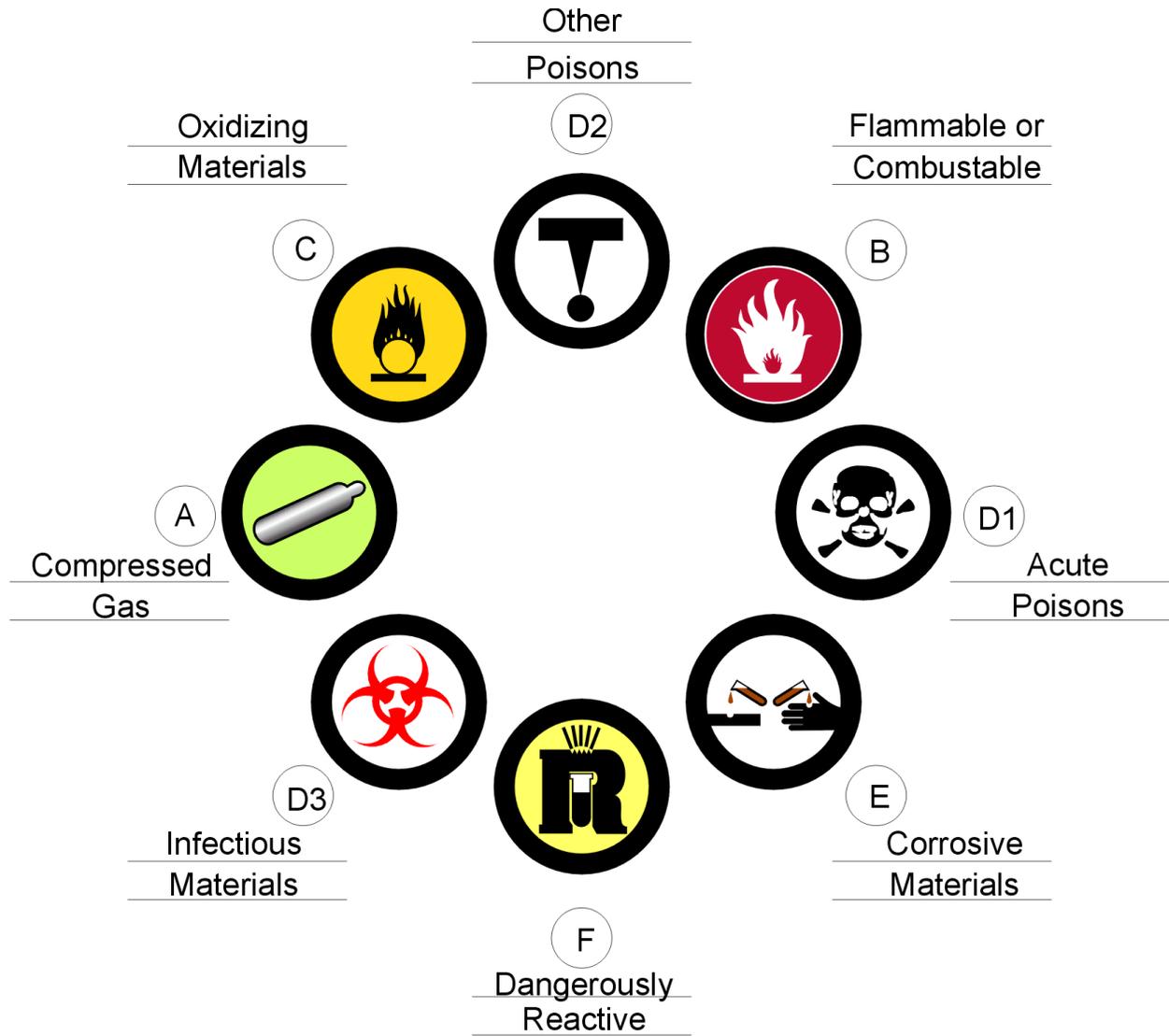
## **Computer use**

- Use word processing software, for example, to write letters to customers.
- Use computer-assisted design, manufacturing and machining equipment.

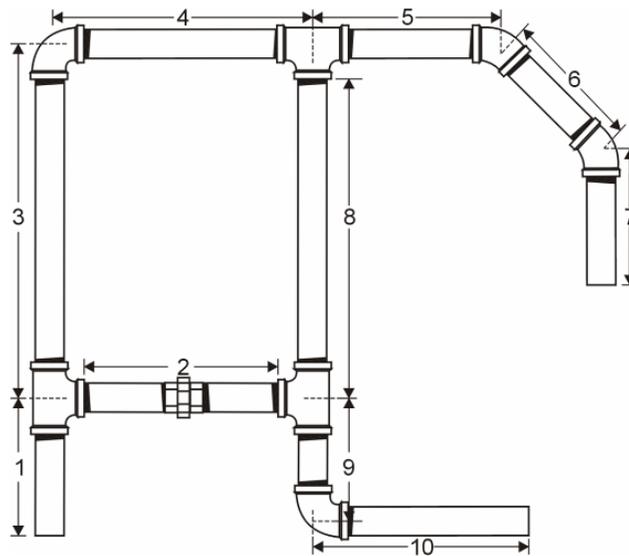
## **Continuous learning**

- Keep up-to-date with changes to the Canadian Plumbing Code.
- Take technical courses to learn about new products, procedures and equipment.
- Increase skills and knowledge on the job.
- Attend health and safety training.
- Read trade magazines to stay current.

**WHMIS Answers:**



**Threaded Pipe Answers:**



Measured Pipe Length In Imperial	Pipe Section No.	End To End Measurement In Imperial
10"	1	<b>(8<sup>15</sup>/<sub>16</sub>" ) 8<sup>7</sup>/<sub>8</sub>" or 9"</b>
<b>2' 2<sup>1</sup>/<sub>2</sub>"</b>	2	<b>2' 3<sup>7</sup>/<sub>8</sub>"</b>
3' 10 <sup>1</sup> / <sub>2</sub> "	3	<b>3' 8<sup>3</sup>/<sub>8</sub>"</b>
2' 6"	4	<b>2' 3<sup>7</sup>/<sub>8</sub>"</b>
18 <sup>1</sup> / <sub>4</sub> "	5	<b>(16<sup>9</sup>/<sub>16</sub>" ) 16<sup>1</sup>/<sub>2</sub>" or 16<sup>5</sup>/<sub>8</sub>"</b>
11 <sup>3</sup> / <sub>8</sub> "	6	<b>10<sup>1</sup>/<sub>8</sub>"</b>
1' 0"	7	<b>11<sup>3</sup>/<sub>8</sub>"</b>
<b>3' 8<sup>3</sup>/<sub>4</sub>"</b>	8	<b>3' 8<sup>3</sup>/<sub>8</sub>"</b>
6 <sup>3</sup> / <sub>4</sub> "	9	<b>4<sup>5</sup>/<sub>8</sub>"</b>
23 <sup>1</sup> / <sub>2</sub> "	10	<b>(22<sup>7</sup>/<sub>16</sub>" ) 22<sup>3</sup>/<sub>8</sub>" or 22<sup>1</sup>/<sub>2</sub>"</b>

Imperial	Throw	Thread Engagement	Fitting Allowance
90° ELL	1 <sup>3</sup> / <sub>4</sub> "	1 <sup>1</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "
45° ELL	1 <sup>5</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "	5 <sup>5</sup> / <sub>8</sub> "
TEE	1 <sup>3</sup> / <sub>4</sub> "	1 <sup>1</sup> / <sub>16</sub> "	1 <sup>1</sup> / <sub>16</sub> "
Size of Line = 1 <sup>1</sup> / <sub>4</sub> " Imperial			

**Section 6:**

**Throw (T) – Thread Engagement (TE) = Fitting Allowance (FA)**

**(FA + FA) – 11 3/8" C-C = E-E (5/8" + 5/8") – 11 3/8" = 10 1/8" E-E**

## Plumbing Code Questions Answers:

13. The minimum size cleanout (CO) for the building is?
- e. 50 mm
  - f. 75 mm
  - g. 100 mm
  - h. Same as building drain
14. The minimum size building sewer is?
- e. 50 mm
  - f. 75 mm
  - g. 100 mm
  - h. Same as building drain
15. The minimum slope a trap arm must be graded is?
- e. 1%
  - f. 2%
  - g. 3%
  - h. 4%
16. Piping that is placed underground by the Plumber must be covered with a minimum of \_\_\_\_\_ mm of granular material, then carefully placed and tamped over the pipe.
- e. 100
  - f. 200
  - g. 300
  - h. 400
17. The minimum size of main stack required in a single –family home is?
- e. 2"
  - f. 3"
  - g. 4"
  - h. Same size as the building sewer
18. No water closet may be installed in a room that is not properly lighted and ventilated.
- c. True
  - d. False

19. When determining the location of the main plumbing stack, what should be considered: \_\_\_\_\_ To keep it as close as possible to the main floor fixtures.
20. Structural members can be compromised to accommodate plumbing in a building.  
c. True  
d. False
21. The minimum size vent required that serves a water closet is \_\_\_\_\_"/  
\_\_\_\_\_mm.  
e. 1.25/32  
f. 1.50/40  
g. 2/50  
h. 3/75
22. The maximum size of trap arm that may drain into a wet vent is \_\_\_\_\_ mm, with the exception of an emergency floor drain.  
e. 32  
f. 40  
g. 50  
h. 75
23. A 2" trap arm that is installed with a 4% grade will have a maximum developed length of?  
e. 2'-0"  
f. 4'-0"  
g. 5'-0"  
h. 6'-0"
24. When planning the path or route to the main plumbing stack, what should you always consider before installation? shortest route with not more than 45° change in direction.