ASSESSMENT GUIDE – 28970

DOMAIN	Refrigeration and Air Conditioning				
STANDARD	28970	v1	Demonstrate knowledge of the principles of refrigeration and air conditioning.	Level 3	15 Credits
ENTRY	There are no pre-requisite unit standards.				

LEARNER TO COMPLETE	
Name	Company
NSI No.	Email / phone

Pre-assessment confirmation

I, the **learner**,

- Understand the assessment process and assessment requirements for this unit.
- Understand the appeals and resubmission processes.
- Believe I have the skills and knowledge to successfully complete the assessment requirements.

Assessment Submission: (Tick ✓ appropriate circle)	○	1st Submission	○	1st Resubmission	○	Final Resubmission

ASSESSOR TO COMPLETE	
Name	Company
Email / phone	

Pre-assessment confirmation

I, the assessor, can confirm the learner has achieved any pre-requisite requirements.	○

ASSESSMENT JUDGEMENT & RESULT	
I, the **assessor**, have reviewed the learner's evidence for Unit Standard 28970 v1 and judge that it is sufficient and authentic.	**YES / NO**
I, the **assessor**, confirm the learner has achieved this unit standard.	**YES / NO**
Signature	Date

POST ASSESSMENT FEEDBACK
RESUBMISSION DETIALS (IF REQUIRED)

LEARNER INSTRUCTIONS:

YOU WILL NEED TO BE ABLE TO:

- Describe the main components of a refrigeration system and refrigeration cycles
- Describe the main components of a split air conditioning systems
- Explain the physics that relate to refrigeration and air conditioning
- Explain the basic principles of food storage
- Establish the parameters of a small refrigeration system and heat pump.

IMPORTANT INFORMATION

- Carefully read through this Assessment Guide so you know exactly what is expected.
- All evidence you provide for this assessment must be your own work.
- You can attach additional material which shows you have the required skills and knowledge, e.g. job sheets, checklists, work samples, photos, screenshots, videos.
- Clearly name and label all attached evidence. . Labels for photos must describe the activity being performed in the photo.
- Your assessor may choose a verifier from your workplace to observe and/or verify your work.

What you need to do		Tick when complete
Question Set 1	Answer questions about refrigeration systems	○
Question Set 2	Answer questions about air conditioning systems.	○
Question Set 3	Answer questions about basic principles of cold food storage.	○
Question Set 4	Answer questions about physics related to refrigeration and air conditioning.	○
Question Set 5	Answer questions about the refrigeration cycle.	○
Practical worksheet 1	Establish operating parameters of a small refrigeration system and a heat pump	○

RESUBMISSIONS:

Under Apprentice Training New Zealand (ATNZ) policy you have a maximum of **two** resubmission opportunities for this assessment. In total you will have three opportunities to meet the unit standard requirements. Information about the ATNZ resubmission process can be found in the Learner Regulations.

APPEALS:

Your Assessor, Observer or Verifier will discuss with you ATNZ's Assessment Appeals process before carrying out this assessment. Information about the Assessment Appeals process can be found in the Learner Regulations.

Question Set 1 – Demonstrate knowledge of refrigeration systems

Answer the following questions about refrigeration and air conditioning systems.

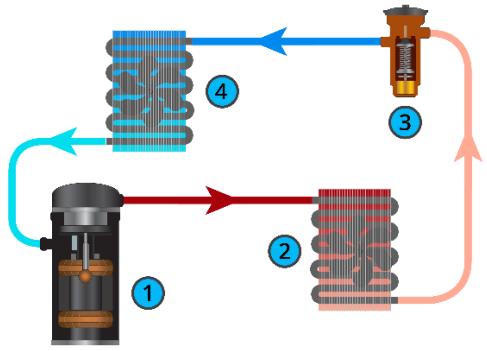
- Use your own words
- You can answer the questions in writing or give your answers verbally to your assessor who will write down what you say. *You may need to arrange this in advance.*
- Your assessor may ask you additional questions to check your knowledge and understanding.

Your name		
Workplace		
Answers written by:	**Learner** ○	**Assessor** ○ *When using verbal questioning, record key points from the learner's responses as accurately and fully as possible.*

QUESTION SET 1

1. Using the diagram below.
Identify the FOUR (4) major components of a typical refrigeration system.

PC 3.1



System component	Identify the name of component	✓
1		○
2		○
3		○
4		○

2. Describe the function of Component 1

PC 3.1

3. Describe the function of Component 2

PC 3.1

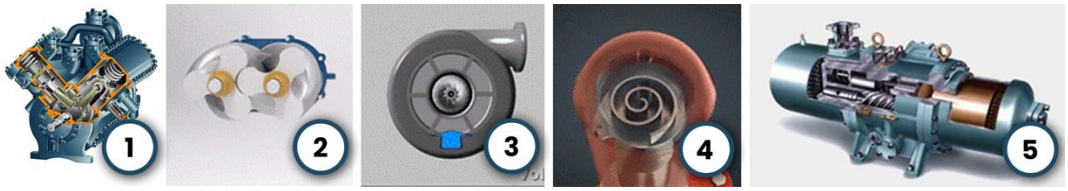
4. Describe the function of Component 3

PC 3.1

5. Describe the function of Component 4

PC 3.1

6. In RAC there are five commonly used types of compressors. Using the images below, answer the following questions. PC 3.2



Identify each type

Compressor	Name	✓
1		○
2		○
3		○
4		○
5		○

7. Draw a line to Match type to the function. PC 3.2

Compressor	Function	✓
Reciprocating compressor	Two scrolls compress vapour as one of the scrolls moves around the other fixed scroll.	○
Screw Condenser	Vanes sit on an off-centre shaft which rotates to reduce the volume inside the cylinder.	○
Centrifugal compressor.	The vapour is compressed between the threads of two rotating screws.	○
Scroll compressor	A rotor with several blades rotates in a housing, pulls in vapour and discharges it with a spinning force	○
Rotary compressor	A piston travels back and forth within a cylinder.	○

8. Draw a line to Match the compressor type to the function. PC 3.2

Compressor	Benefits	✓
Reciprocating compressor	Quiet and efficient. Simplistic design requires lower maintenance	○
Screw Condenser	Very efficient. Good for a domestic air conditioning system. Small compressor that operates over a large capacity range	○
Centrifugal compressor.	Small and light. Very efficient. Operate over large capacity. Can pump liquids.	○
Scroll compressor	Easy to service. Very efficient. Widely used so easy and quick to get parts.	○
Rotary compressor	Very efficient with a large capacity range. Quiet. Needed for air conditioning in a large building	○

9. Use the images below to answer the following questions. PC 3.3

Name the basic electrical components/controls

Compressor	Name	✓
1		○
2		○
3		○
4		○
5		○
6		○

10. Draw a line to Match the component to the description of its function. PC 3.3

Electrical component / control	Function	✓
Contactor	Stores electrical energy and release it when needed e.g. by providing the power boost to start the compressor. (The compressor requires a significant amount of power to begin its operation). Once the compressor is running, the capacitor helps maintain a steady flow of power.	○
Thermostat	Controls refrigerant flow by opening or closing based on electrical signals	○
Temperature sensor	Regulates temperature by turning the system on or off as needed	○
Solenoid Valve	Ensures that electrical signals and power are transmitted effectively between parts like the compressor, thermostat, and fans.	○
Relay	Measures temperature	○
Capacitor	Opens and closes electrical circuits.	○

11. Using the images below, match each material used for **insulating** a refrigerated space with its name. PC 3.4

Insulation	Name	✓
1		○
2		○
3.		○

12. **Draw a line to Match** the insulation type with its properties. PC 3.4

Insulation	Properties	✓
Polyurethane foam	Flexible and easy to install, with good thermal insulation and a vapor barrier.	○
Polystyrene	Offers high thermal resistance and strength, making it ideal for keeping temperatures low. Less flammable than polystyrene.	○
Flexible elastomeric foam	Available in EPS and XPS forms, it has low thermal conductivity and is durable. Reduced use as some insurance companies won't insure if used because of its flammability.	○

13. Using the images below, match each material used for **sealing** a refrigerated space with its name. PC 3.4

Sealant	Name	✓
1		○
2		○
3.		○

14. Draw a line to Match the sealant type with its properties PC 3.4

Sealant	Properties	✓
Silicone sealants	Adhesive and flexible, used for sealing seams in insulation	○
Butyl rubber tape	Adhere well to many surfaces, resistant to moisture and chemicals, used for sealing gaps and joints	○
Polyurethane sealants	Flexible and heat-resistant, used for sealing joints and gaps.	○

15 Explain why copper pipework is used in some refrigeration systems and aluminium pipework in others. PC 3.5

	○

16. Which of the following defrost cycles is used in modern refrigeration systems? Select all that apply. PC 3.7

Answer	Options	
○	Electric defrost	○
○	Ambient (passive) defrost	
○	Hot gas defrost	
○	Water spray defrost	

17. Draw a line to Match the defrost cycle with the descriptions

PC 3.7

Defrost cycle	Description	✓
Electric defrost	When the system turns off or enters a defrost cycle, the evaporator fan continues to operate, allowing the warmer ambient air to circulate around the evaporator coils. Only suitable in applications above 2° C.	○
Ambient (passive) defrost	With the evaporator fans turned off, water is distributed over the coil to melt ice. This method is very efficient and often used in large commercial systems.	○
Hot gas defrost	Defrost cycle is activated by an electrical signal once a selected pressure, temperature, ice thickness or time is reached. Electric heaters near the coils melt the frost quickly. This method is common in both commercial and residential systems.	○
Water spray defrost	The refrigeration cycle is reversed, causing the evaporator to heat up and melt the frost. Hot refrigerant gas is directed to the coils to melt the frost quickly.	○

Question Set 2 - Air conditioning systems.

Answer the following questions about refrigeration and air conditioning systems.

- Use your own words
- You can answer the questions in writing or give your answers verbally to your assessor who will write down what you say. *You may need to arrange this in advance.*
- Your assessor may ask you additional questions to check your knowledge and understanding.

Your name		
Workplace		
Answers written by:	**Learner** ○	**Assessor** ○ *When using verbal questioning, record key points from the learner's responses as accurately and fully as possible.*

QUESTION SET 2

1. Explain the requirements for personal comfort in Aotearoa by filling in the missing text. PC 4.1

In Aotearoa, the Healthy Homes standards recommends comfortable [ ] involves keeping [ ] between 18°C and 24°C. [ ] should be kept between 30% and 60% to avoid discomfort. Good air quality is also important, which means ensuring [ ] and using filters to remove [ ].	○

2. Explain how air conditioning can manage **heating**. PC 4.2 PC 2.6

	○

3. Explain how air conditioning can manage **cooling**. PC 4.2 PC 2.6

	○

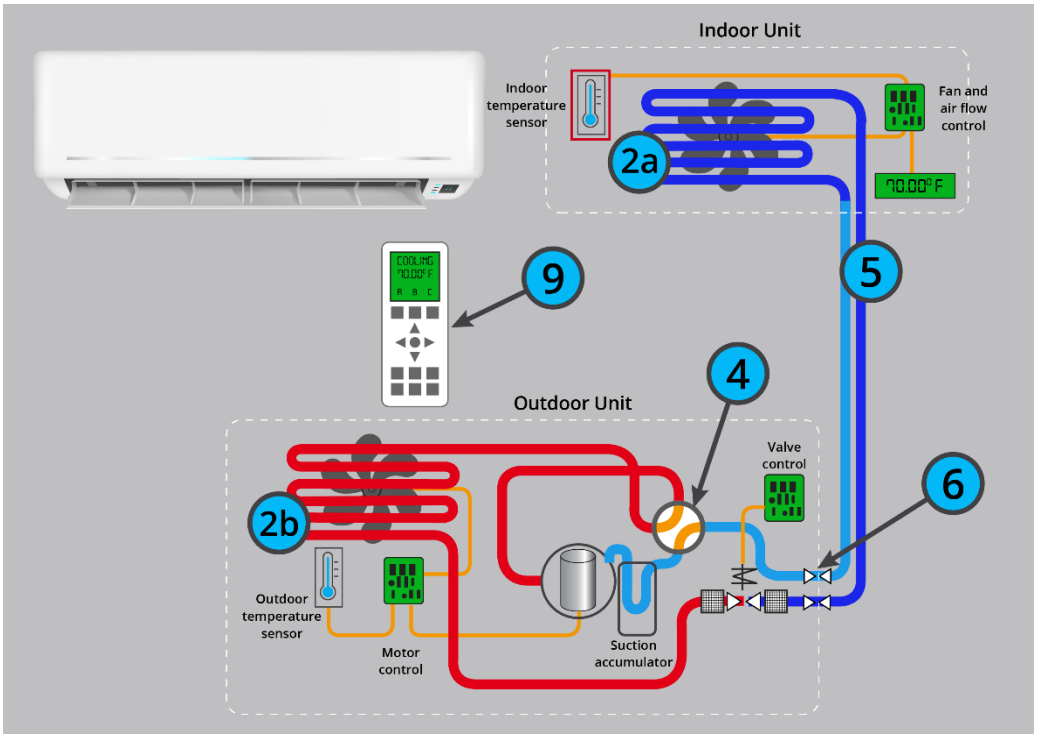
4. Explain how air conditioning can manage **humidity**.

PC 4.2
PC 2.6

	○

5. Using the image below, answer the following questions.

PC 4.3



Identify each of the components in the image by **drawing a line to match** the number to the name of the component.

System component number	**Name the outdoor unit component.**	✓
2b	Controller	○
4	Insulated pipework	○
6	Fan	○
2a	Reversing valve.	○
9	Check valve	○
5	Fan	○

6. There are TWO (2) fans in the image. **Draw a line to Match** the number of the fan with the description of its function. PC 4.3

System component number	Description of the function	✓
2b	In cooling mode it sends cool air out from the evaporator into the space that is being cooled. It also takes warm air from the indoor space and passes this air across the evaporator coils. The heat from this air helps the refrigerant boil and turn into a saturated vapour.	○
2a	The component blows air over the condenser coils to help dissipate the heat more efficiently.	○

7. **Draw a line to Match** the components with the description of the function PC 4.3

System component number	Description of the function	✓
Reversing valve.	It's a controller. It sends signals to adjust temperature, mode (heating or cooling), fan speed, sets a timer.	○
Check valve	It directs the refrigerant from the compressor to the outdoor or indoor coils depending on whether the system is in heating or cooling mode.	○
Controller	Allows the flow of refrigerant to go in one direction.	○

8. Explain the role and function of insulated pipework in the system illustrated above. PC 4.3

JUDGEMENT STATEMENT

- The learner' can describe the functions and of each identified component.

The pipework connects the [ ] of the air conditioning system. In [ ], they transport the refrigerant back and forth, with one carrying the [ ] and the other carrying the low-pressure gas. In [ ], it sends hot, [ ] to the indoor coil and returns hot, high-pressure liquid back to the outdoor unit.	○

9. Think about the air conditioning system in the previous questions. Answer the following questions to determine what would be required to expand it for use in a commercial building. PC 4.4

List **TWO (2) major components** (from Question Set 1), and **THREE (3) other components** (from the previous questions in this set) that would be different in a commercial environment compared to a smaller system.

Major Components	✓	Other components	✓
	○		○
	○		○
	○		○

10. **Draw a line to Match** the **major components** with the description of how they will be different in a commercial environment. PC 4.4

Component	Difference	✓
Compressor	It might be bigger to allow for more refrigerant flow.	○
Expansion valve	There would be more because there would be many more indoor units in the building	○
heat exchanger coils	It would be more powerful and there might be more than one.	○

11. **Draw a line to Match** the **other components** with the description of how they will be different in a commercial environment. PC 4.4

Component	Difference	✓
Fans	it would be more complex and there might also be ducting	○
pipework	this would be more complex and probably be a centralised control system on a PC, as well as individual remotes for all the indoor units. Might be a BC box.	○
controller	would be much bigger and there would be more of them throughout the system	○

Question Set 3 – Basic principles of cold food storage.

Answer the following questions about refrigeration and air conditioning systems.

- Use your own words
- You can answer the questions in writing or give your answers verbally to your assessor who will write down what you say. *You may need to arrange this in advance.*
- Your assessor may ask you additional questions to check your knowledge and understanding.

Your name		
Workplace		
Answers written by:	**Learner** ○	**Assessor** ○ *When using verbal questioning, record key points from the learner's responses as accurately and fully as possible.*

QUESTION SET 3

1. Describe how the refrigerated storage of food effects food **quality**, food **safety**, and growth of **microorganisms**. PC 5.1

	○

2. Identify the safe temperature ranges for storing food in freezers.

Answer	Options	
○	Between minus 12°C and minus 20°C	○
○	Between minus 16°C and minus 24°C	
○	Between minus 18°C and minus 24°C	

3. Identify the safe temperature ranges for storing food in refrigerators. PC 5. 2

Answer	Options	
○	Between 0°C and 4°C	○
○	Between 0°C and 5°C	
○	Between -1°C and 5°C	

4. State the maximum safe periods refrigerated and frozen foods may be left out of a chiller or freezer. PC 5.3

Some meat that had been refrigerated has been taken out of the freezer and is now in a room that is at 15°C. Explain how long the meat can it be left out for in this environment before it must be thrown away?

	Tick
	○

5. A freezer that was storing frozen products broke down. The freezer is very full. Explain how long can you keep this product for before it should be thrown away? PC 5.3

	Tick
	○

6. The following questions are about the effects of high and low humidity on food in cold storage. PC 5.4 PC 2.6

Select all the ways in which **low humidity** in a refrigerated space can affect food.

Answer	Options	
○	Food dries out, losing attractive texture such as crispness	○
○	Drying out can cause it to get tough	
○	Can lose flavour if it dries out	
○	It can go mouldy	
○	More microbial growth that can ruin food	
○	Can go soggy and look unattractive	

7. Select all the ways in which **high humidity** in a refrigerated space can affect food. PC 5.4 PC 2.6

Answer	Options	
○	Food dries out, losing attractive texture such as crispness	○
○	Drying out can cause it to get tough	
○	Can lose flavour if it dries out	
○	It can go mouldy	
○	More microbial growth that can ruin food	
○	Can go soggy and look unattractive	

Question Set 4 – Physics related to refrigeration and air conditioning

Answer the following questions about refrigeration and air conditioning systems.

- Use your own words
- You can answer the questions in writing or give your answers verbally to your assessor who will write down what you say. *You may need to arrange this in advance.*
- Your assessor may ask you additional questions to check your knowledge and understanding.

Your name		
Workplace		
Answers written by:	**Learner** ○	**Assessor** ○ *When using verbal questioning, record key points from the learner's responses as accurately and fully as possible.*

QUESTION SET 4

1. The left-hand column of the table below contains terms as its used in refrigeration and air conditioning. PC 1.1 PC 1.5

A. Draw a line to **match the term** with the **correct definition** of each term in the right-hand column.

Term	The definition of this term as used in refrigeration and air conditioning is:	✓
Saturation	The temperature a thermometer would read if its bulb were covered with a water-soaked cloth and exposed to moving air. It is the lowest temperature that air can reach through the process of evaporative cooling.	○
Latent heat of fusion	The quantity of energy that is needed to increase the mass of a substance (for example a refrigerant) by 1°C.	○
Latent heat of evaporation	The point where a refrigerant is between both liquid and vapour states. If more heat is added, it will vaporise, if heat is taken away it will condense.	○
Specific heat	The amount of energy needed to be added or removed to change the state of a refrigerant between a vapour and a liquid.	○
Dry bulb temperature	The temperature of the air measured by a regular thermometer, without taking into account the moisture content of the air. It measures sensible heat.	○
Wet bulb temperature	The amount of energy needed to be added or removed to change the state of a refrigerant between a solid and a liquid.	○

2 Explain what the term Relative Humidity means

PC 1.1
PC 1.5

	Tick
	○

3 Draw a line to **match the term** with the **correct definition** of each term in the right-hand column.

PC 1.1
PC 1.5

Term	The definition of this term as used in refrigeration and air conditioning is:	✓
Specific volume	The amount of mass in an object in relation to its volume	○
Specific density	The density of a material compared with the density of the same volume of water or air	○
Specific gravity	Shows how much space a given weight of mass takes up	○

4. The first column of the table below lists measurement concepts used for refrigeration and air conditioning.
In the second column, write down the unit of measurement for each term, and

PC1.4
PC1.5

SI Unit	Name	✓
Thermodynamic Temperature		○
Pressure		○
Specific volume		○
Specific density		○
Specific gravity		○

5 Match the symbol to the SI Unit.

PC1.4
PC1.5

Symbol No.	Symbol
1	K
2	Pa
3	m^3/kg
4	kg/m^3
5	There is no unit

SI Unit	Symbol	✓
Specific density		○
Specific gravity		○
Specific volume		○
Thermodynamic Temperature		○
Pressure		○

6. This question consists of THREE (3) parts and relates to the application of different methods of heat transfer in refrigeration and air conditioning. PC 1.2

Explain what happens when heat transfers through **conduction** and give ONE (1) example where it occurs in a refrigeration system.

	Tick
	○

7 Explain what happens when heat transfers through **convection** and give ONE (1) example where it occurs in a refrigeration system. PC 1.2

	Tick
	○

8 Explain what happens when heat transfers through **radiation** and give ONE (1) example where it occurs in a refrigeration system. PC 1.2

	Tick
	○

9 This question consists of two parts and relates to the first and second laws of thermodynamics in terms of energy, heat, work, and enthalpy. PC 1.3

In the table below, Match description of each law of thermodynamics.

Law	Description	✓
First Law	Energy can be changed from one form to another, but it cannot be created or destroyed	○
Second Law	In a closed system, the total entropy of the system, and its surroundings, increases over time. Heat will always go from hot to cold	○

10. Below are two statements that are used to explain the first and second laws of thermodynamics in a RAC system. Fill in the missing words to make the statements true/correct for each law. PC 1.3

In a RAC system, the [ ] dictates that different parts of the system transform and transfer [ ] in the form of [ ]. The [ ] is done by the compressor. [ ] represents the total heat content of the system, including internal energy and pressure-volume work.	○
The [ ] dictates that a RAC system needs external [ ] to move [ ] from a cold space to a hot space because this goes against the natural direction of heat flow. To increase the] of the refrigerant, mechanical [ ] is needed, and this is done by the compressor.	○

Question Set 5 - The refrigeration cycle.

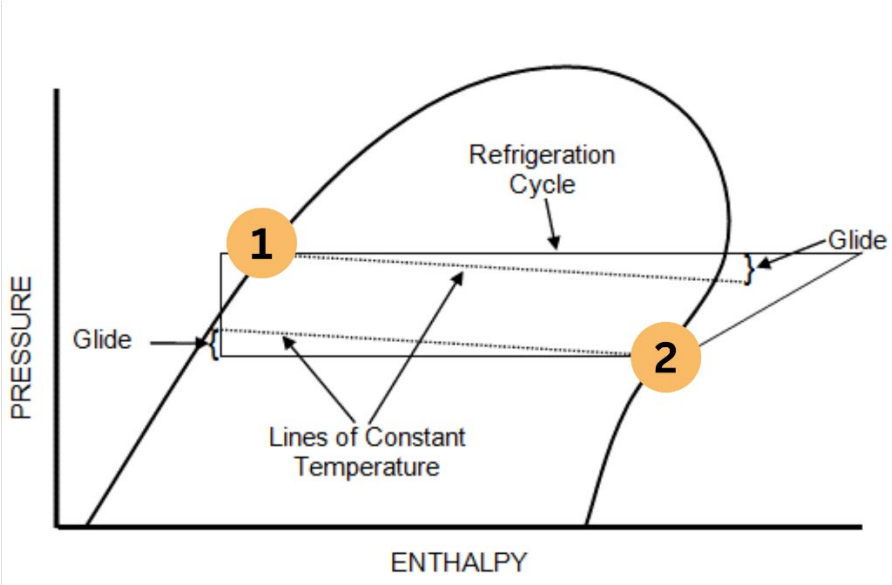
Answer the following questions about refrigeration and air conditioning systems.

- Use your own words
- You can answer the questions in writing or give your answers verbally to your assessor who will write down what you say. *You may need to arrange this in advance.*
- Your assessor may ask you additional questions to check your knowledge and understanding.

Your name		
Workplace		
Answers written by:	**Learner** ○	**Assessor** ○ *When using verbal questioning, record key points from the learner's responses as accurately and fully as possible.*

QUESTION SET 5

Look at the Mollier chart below and use it to answer three questions. PC 2.2



A. Write down the name for points 1 & 2 and explain each point means.

1.. Identify points 1 and 2 PC 2.2

Point	Name	✓
1.		○
2.		○

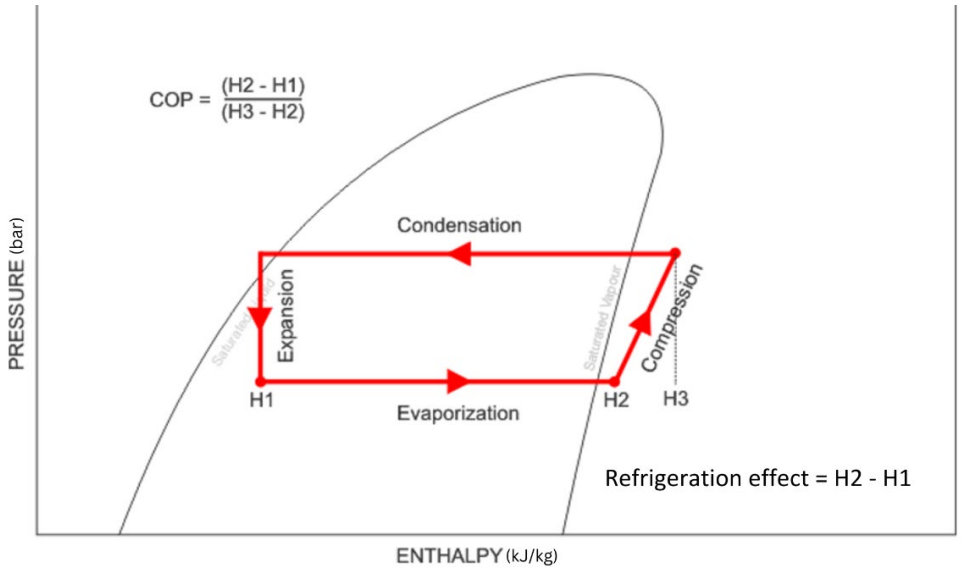
2. Match the descriptions below for points 1 and 2 PC 2.2

Name of Point	Explanation	✓
1.	This is the temperature at which saturated vapour refrigerant begins to condense if any heat is removed.	○
2.	This is the temperature at which saturated liquid refrigerant begins to vaporise if heat is added.	○

3. Explain what glide means as shown in the Mollier diagram above. PC 2.2

	Tick
	○

4. The refrigeration cycle has been superimposed on a Mollier chart below. Use this chart as a reference point to answer the following questions. PC 2.3



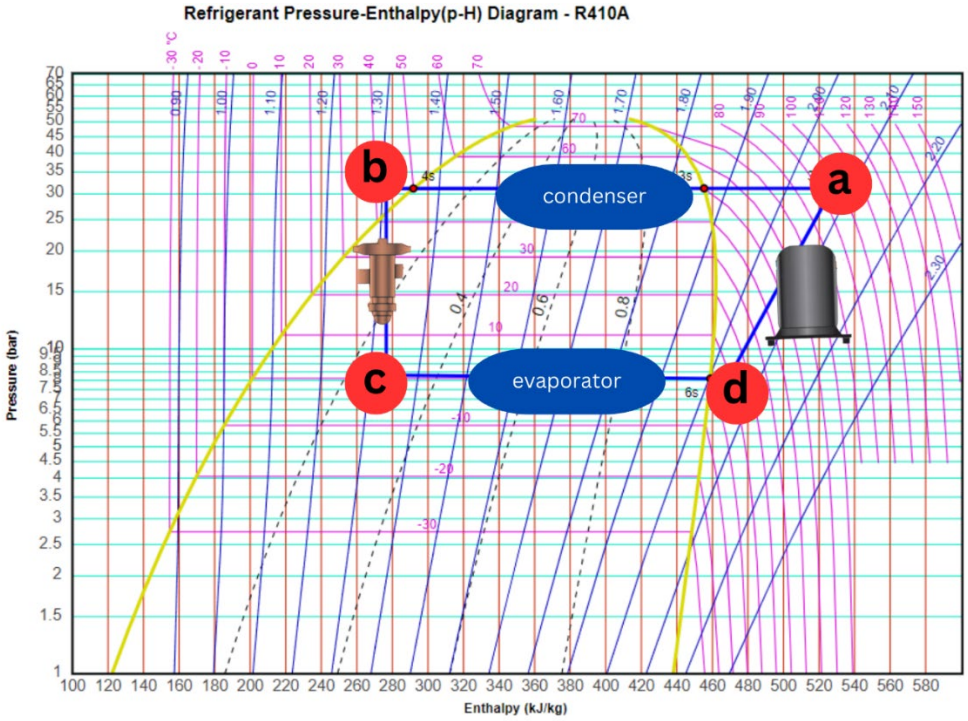
4 With reference to the above chart, explain the term ***coefficient of performance***. PC 2.3

	Tick
	○

5 With reference to the above chart, explain the term *refrigeration effect*. PC 2.3

	Tick
	○

Look at the pressure enthalpy diagram below for R410A refrigerant and use this to answer the following questions. PC 2.4 PC 3.6



The refrigerant goes through four stages of transformations as it progresses from a to b, b to c, c to d, and d to a. Explain the different changes in the table below as follows:

6 Explain how the **volume** changes

PC 2.4
PC 3.6

Variation	a to b	b to c	c to d	d to a
Change in refrigerant volume				

Tick ○

7 Explain how the temperature changes

PC 2.4
PC 3.6

Variation	a to b	b to c	c to d	d to a
Change in refrigerant temperature				

Tick ○

8 Explain how the **pressure** changes

PC 2.4
PC 3.6

Variation	a to b	b to c	c to d	d to a
Change in refrigerant **pressure**				

Tick ○

9 Explain how the **state** transforms

PC 2.4
PC 3.6

Variation	a to b	b to c	c to d	d to a
Transformation in refrigerant **state**				

Tick ○

10. This question has three parts and relates to the impact of compression and expansion, refrigeration principles, and the relationship between pressure, volume, and saturated temperature on refrigerant pressure. PC 2.5

In the table below two laws are listed. Match the description of each law in the second column.

Law	Description	✓
Ideal gas law	when a gas is compressed pressure and temperature increase	○
Boyles law	when pressure increases, volumes decrease	○

11 Explain how compression and expansion affect the pressure of a refrigerant. PC 2.5

	Tick
	○

12 Explain how the relationship between volume and saturated temperature affects the pressure of a refrigerant. PC 2.5

	Tick
	○

13. Describe **AND** compare **critical** refrigeration systems and **non-critical** refrigeration systems. PC 2.7

	Tick
	○

14. Use the following measurements taken from a small refrigeration system that uses R134a to answer the questions below.:

PC 2.1
PC 6.2

Temperature entering the condenser	45°C
Temperature leaving the evaporator	5°C
Superheat and subcooling	both at 6°C

Tick ○

A. **Download** a pressure enthalpy chart for the refrigerant used in the above small refrigeration system. OR
   Use an app such as Danfoss Coolselector
B. **Plot** the temperature and pressure measurements onto the chart.
C. **Upload** your result here.

15. Use the following measurements taken from a heat pump that uses R410A to answer the questions below.

PC 2.1
PC 6.2

Temperature entering the condenser	50°C
Temperature leaving the evaporator	8°C
Superheat and subcooling	both at 7°C

Tick ○

A. **Download** a pressure enthalpy chart for the refrigerant used in the above heat pump system.
   OR
   Use an app such as Danfoss Coolselector
B. **Plot** the temperature and pressure measurements onto the chart.
C. **Upload** your result here.

Operating parameters of a small refrigeration system and a heat pump.

- You are required to complete the following tasks on both:
    1. a small refrigeration system **and**
    2. a heat pump.
- Ask your Account Manager or Supervisor at work if you are unsure what system is suitable.
- **A Verifier must be available to observe you carrying out the measurements.**
- To carry out the measurements you will need:
    - Refrigerant gauges suitable for the system that you are measuring
    - Thermometer that is suitable for the tasks listed below
    - Airflow meter
    - Humidity sensor.
- You can answer the questions in writing or give your answers verbally to your assessor who will write down what you say. *You may need to arrange this in advance.*
- Your assessor may ask you additional questions to check your knowledge and understanding.

Your name		
Workplace		
Evidence provided by:	**Learner** ○	**Assessor** ○ *When using verbal questioning, record key points from the learner's responses as accurately and fully as possible.*

Verifier Name		
Verifier Signature		**Date:**

ASSESSMENT JUDGEMENT & RESULT	
I the **assessor**, have reviewed the learner's evidence for the **Practical Worksheet** for Unit Standard 28970 v1 and judge that it is sufficient and authentic.	**YES / NO**
Signature	Date

For both systems you will:

1. Establish operating pressure, temperature, airflow, and humidity parameters of the RAC system.
2. Record all measurements in SI units.
3. Download the appropriate enthalpy chart to plot temperature and pressure measurements.

PRACTICAL WORKSHEET

1. Choose **either** a Small Refrigeration System **OR** A Heat Pump system that you have worked on recently to answer the questions below. PC 3.1 PC 3.2 PC 3.3 PC 3.4 PC 3.5 PC 3.6

Draw a diagram that represents your small refrigeration **OR** heat pump system.

1. Label all components used in the system clearly.
2. Label all electrical components used in the system clearly.
3. Indicate which sections are high-pressure and which are low-pressure. (Or) Label high-pressure and low-pressure sections.
4. Draw/indicate the direction the refrigerant flows.

	VERIFIED ○

A. Identify the type of **compressor** used in the system, and explain why it is suitable for the job?

Type of Compressor	Why is it suitable for the job?	VERIFIED
		○

B. Identify the type(s) of **insulation** used and explain why they are suitable for the job?

Type of Insulation	Why is it suitable for the job?	VERIFIED
		○

C. Identify the type of **pipework** used and explain why this was selected for this job?

Type of pipework	Why is it suitable for the job?	VERIFIED
		○

2. This question has two parts and covers the establishment of the operating parameters, pressure, temperature, airflow, and humidity of a small refrigeration system **AND** a heat pump. PC 6.1

A. Identify a **small refrigeration system** on which to take operating parameter measurements. Write your measurements in the table below under **column A.**
- Identify the **refrigerant** used
- Take the input **pressure** measurements for the condenser, record in SI units.
- Take the input and output **temperature** measurements for the compressor, condenser, expansion valve and evaporator and record in SI units.
- Take the input and output **airflow** measurements for the condenser and evaporator and record in SI units.
- Take the **humidity measurements** for the evaporator and record in SI units.

B. Identify a **heat pump system** on which to take operating parameter measurements. Write your measurements in the table below under **column A.**
- Identify the **refrigerant** used
- Take the input **pressure** measurements for the condenser, record in SI units.
- Take the input and output **temperature** measurements for the compressor, condenser, expansion valve, 3-way valve and evaporator and record in SI units.
- Take the input and output **airflow** measurements for the condenser and evaporator and record in SI units.
- Take the **humidity measurements** for the evaporator and record in SI units.

Parameters / Key component	**A. Small refrigeration system**		**B. Heat Pump system**		**VERIFIED**
	Input (SI Units)	Input (SI Units)	Input (SI Units)	Input (SI Units)	
Refrigerant					○
Pressure:					
Condenser					○
Evaporator					○
Temperature:					
Compressor					○
Condenser					○
Expansion Valve					○
3-way valve					○
Evaporator					○
Airflow:					
Condenser					○
Evaporator					○
Humidity:					
Evaporator					○

Date completed:		**Evidence attached?**	**Yes/No**

- Take the input **pressure** measurements for the condenser, record in SI units.