Topic Skills Practice Cover Sheet

NAT10809003 – Apply Australian standards and requirements to solve LV a.c. circuits/systems problems.
Topic: 3. Three phase four wire systems

Skill Practice Number:	**3.2**
Skill Practice Name:	**Neutral conductor current**

Student Name:	
Student ID:	
College/Campus:	
Group:	

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 3.2

NAT10809003 – Apply Australian standards and requirements to solve LV a.c. circuits/systems problems.

KE-10809003 - LV a.c. circuits/systems problems principles

Topic: 3. Three phase four wire systems

Skills Practice 3.2: Neutral conductor current

Task:
To examine the voltage and current relationships in a three phase star connected system with balanced and unbalanced loads with and without the neutral conductor.

Objectives:

At the completion of this skills practice, you should be able to:

- connect a star connected balanced and unbalanced load for a 4 wire system and a 3 wire system
- measure line and phase voltages in a star connected load
- measure line and neutral currents in a star connected load
- draw the phasor diagrams from the measured results for star connected loads

1. Planning the Skills Practice

1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 Miscellaneous Items:**
• Extra low voltage a.c. supply • One multimeter	• Three phase load e.g. lamps • One three pole switch • Connecting leads	

1.4 Risk Assessment

Risk assessment procedure:

- ✓ Identify any hazards that may exist with this skills practice below
- ✓ List the supervision level you will be working under - Direct (D), General (G) or Broad (B)
- ✓ List the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)
- ✓ List the control measures required for each identified hazard that you need to implement.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s

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2. Carrying Out the Skills Practice

Procedures:

Part A

1. Use the circuit diagram of Figure1 to complete the wiring diagram of Figure 2.

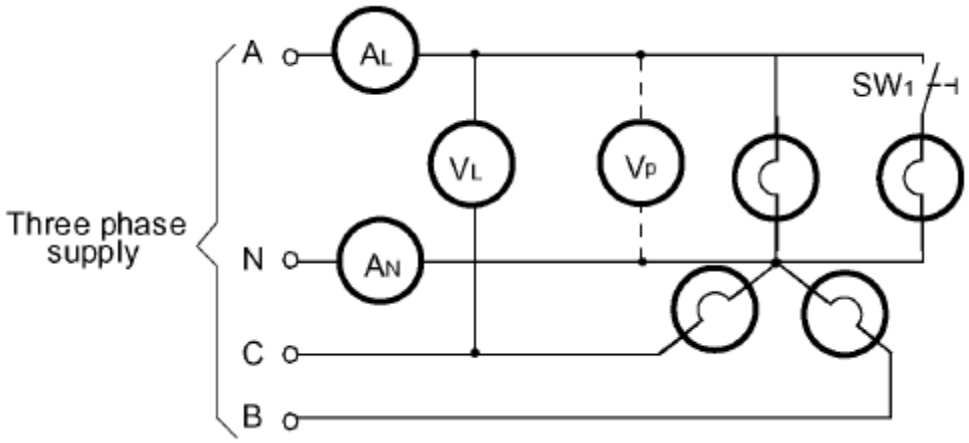

Figure 1 - Circuit diagram, 3 phase and neutral supply to balanced or unbalanced load

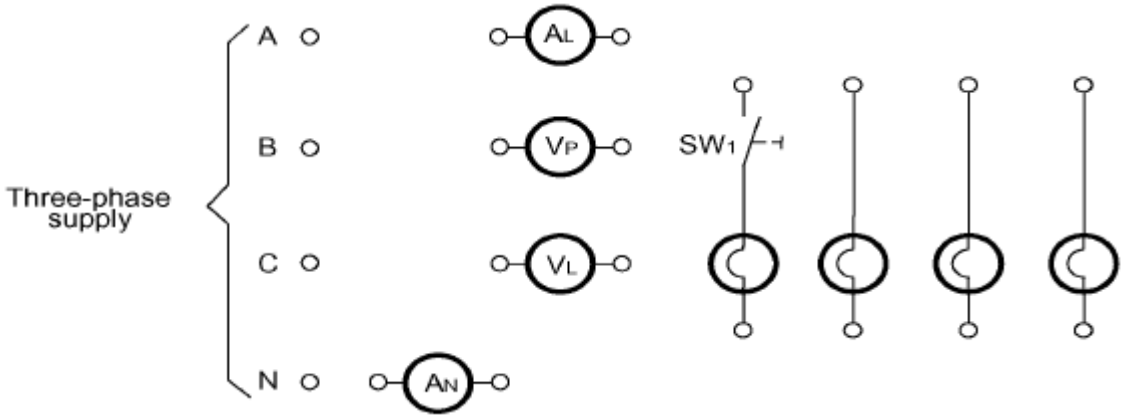

Figure 2 - Equipment layout, 3 phase and neutral supply to balanced or unbalanced load

2. Wire the circuit using the wiring diagram as a guide.

	Feedback: Have your teacher/trainer check your results are correct	Teacher/Trainer Initials and Date	✓

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Part B

1. With SW_1 open, measure the voltages and currents listed in Table 1. Record the results in Table 1.

Neutral Current amperes	*Line Current amperes*		*Line Voltage volts*		*Phase Voltage volts*	
I_N =	I_A		V_{AB}		V_{AN}	
	I_B		V_{BC}		V_{BN}	
	I_C		V_{CA}		V_{CN}	

Table 1 – Balanced Load – neutral connected

2. Close SW1 and measure the voltages and currents listed in Table 2. Record the results in Table 2.

Neutral Current amperes	*Line Current amperes*		*Line Voltage volts*		*Phase Voltage volts*	
I_N =	I_A		V_{AB}		V_{AN}	
	I_B		V_{BC}		V_{BN}	
	I_C		V_{CA}		V_{CN}	

Table 2 – Unbalanced Load – neutral connected

3. Use the circuit diagram Figure 3 to complete the wiring diagram in Figure 4.

4. Wire the circuit using the wiring diagram as a guide. Remember that the supply should be correctly isolated before making the connections.

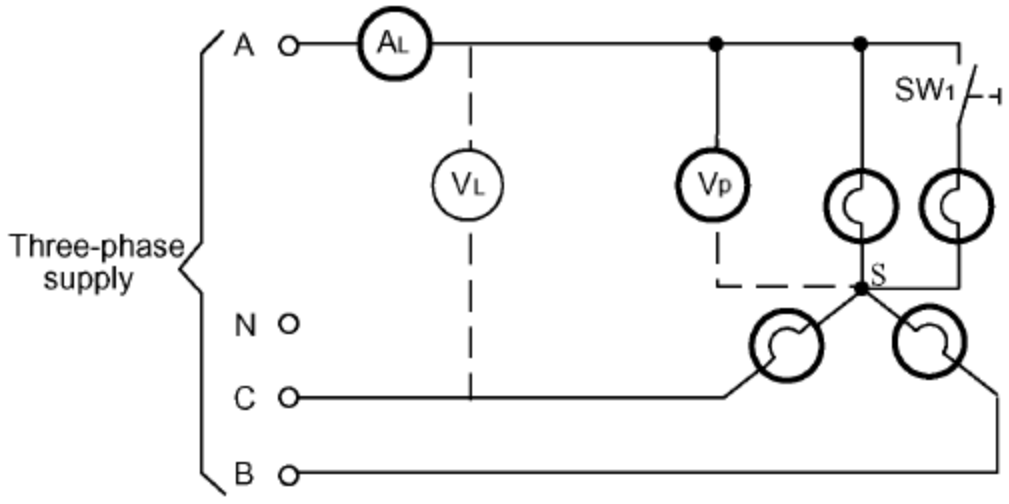

Figure 3 - Circuit diagram, 3 phase supply to balanced or unbalanced load

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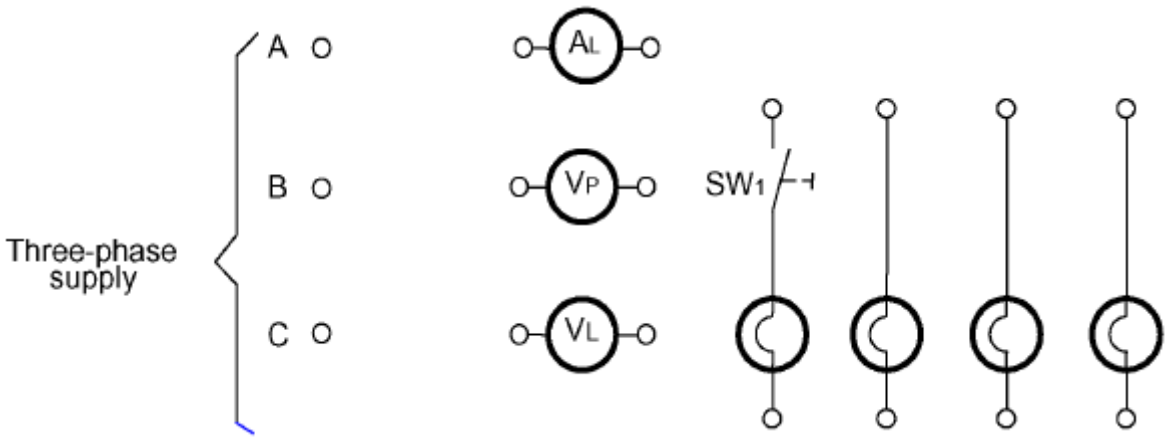

Figure 4 - Equipment layout for 3 phase supply to balanced or unbalanced load

	Feedback Have your teacher/trainer check your results are correct	Teacher/Trainer Initials and Date	√

Part C

1. With SW1 open, measure the voltages and currents listed in Table 3. Record the results in Table 3.

Line Current amperes		***Line Voltage volts***		***Phase Voltage volts***	
I_A		V_{AB}		V_{AS}	
I_B		V_{BC}		V_{BS}	
I_C		V_{CA}		V_{CS}	

Table 3 – Balanced load - Neutral Disconnected

2. Close SW1 and measure the voltages and currents listed in Table 4. Record the results in Table 4.

Line Current amperes		***Line Voltage volts***		***Phase Voltage volts***	
I_A		V_{AB}		V_{AS}	
I_B		V_{BC}		V_{BS}	
I_C		V_{CA}		V_{CS}	

Table 4 – Unbalanced load - Neutral Disconnected

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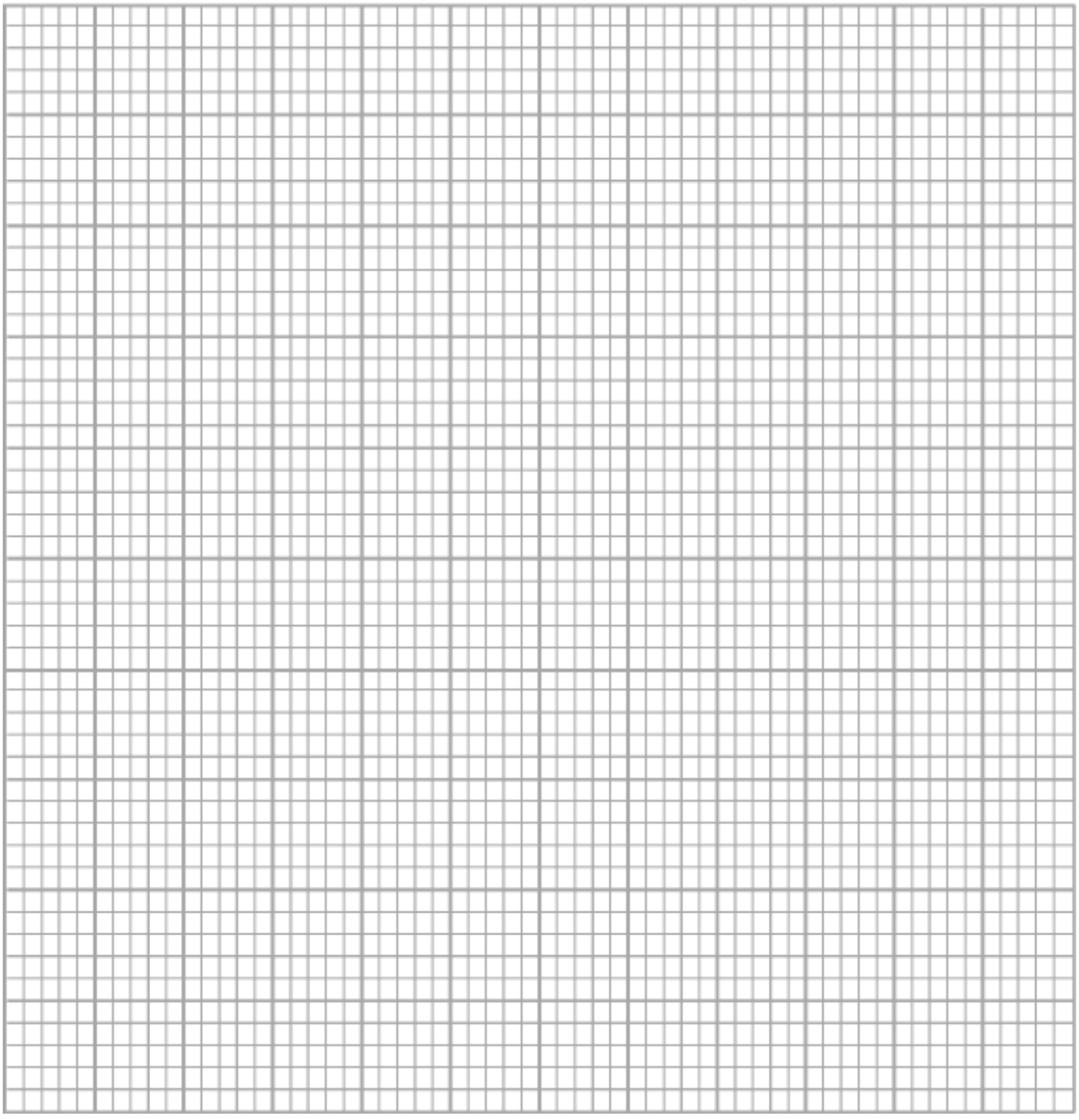
	Feedback Have your teacher/trainer check your results are correct	Teacher/Trainer Initials and Date	√

3. Completing the Skills Practice

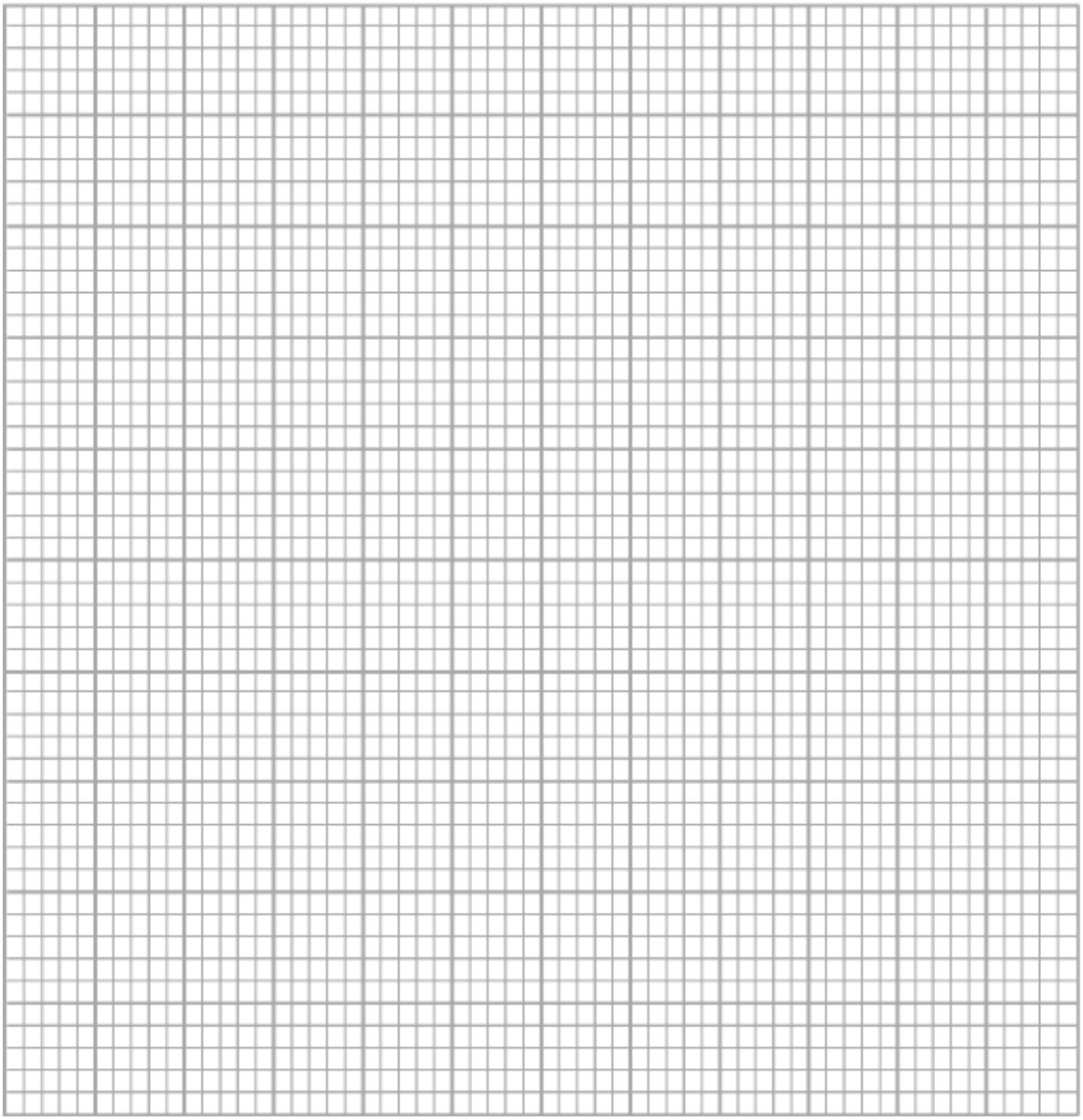
Return all tools and equipment to their correct places and clean the work area.

Observations:

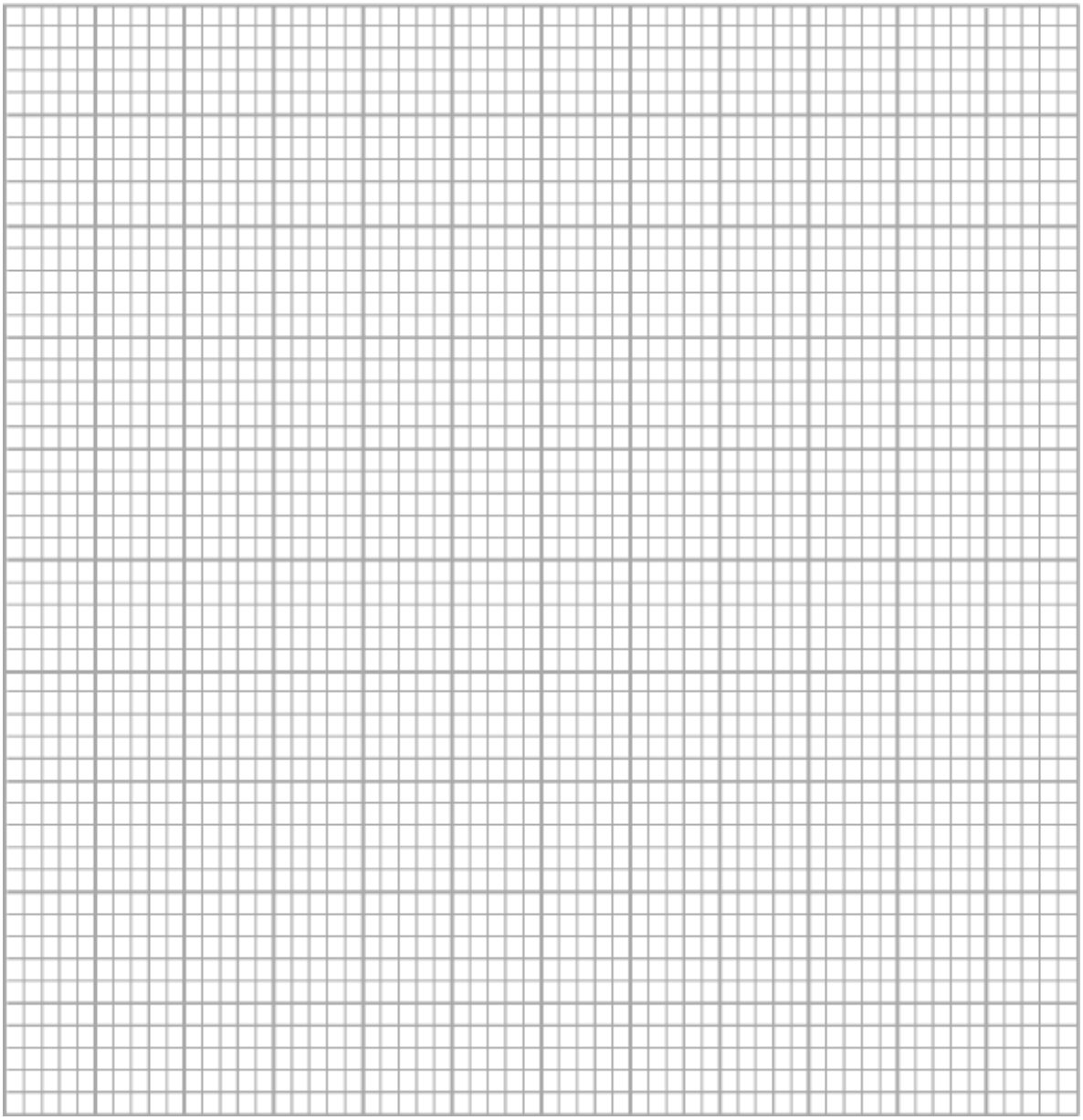
1. Draw a phasor diagram of a balanced star connected load using values from Table 1. Show phasors for the line currents, line voltages and phase voltages. Use VAN as the reference phasor and show the scale used - Scale 10 mm = _____.



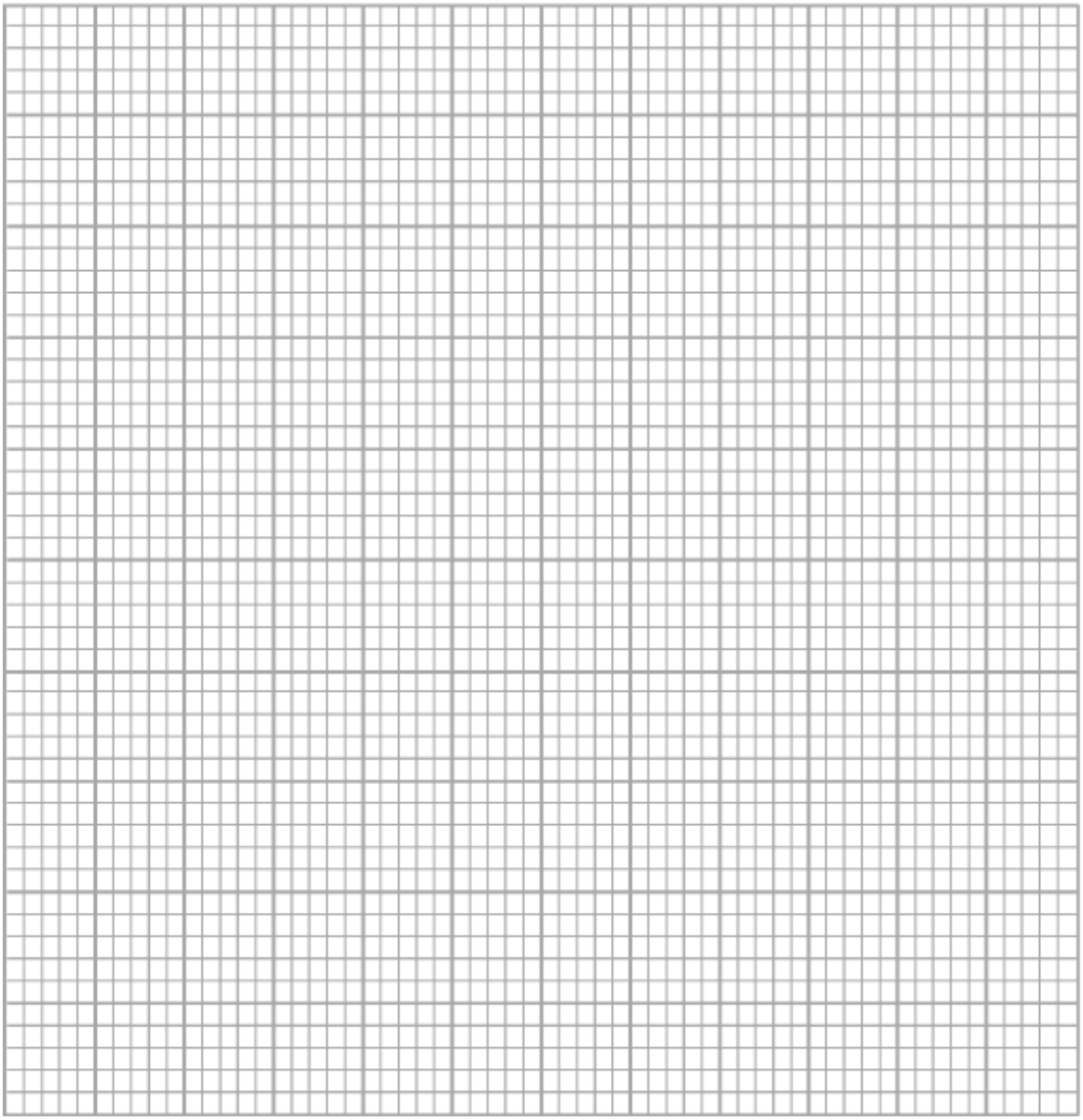
2. Determine the neutral current by phasor addition. State whether IN obtained by phasor is approximately equal to the value of IN recorded in Table 1.



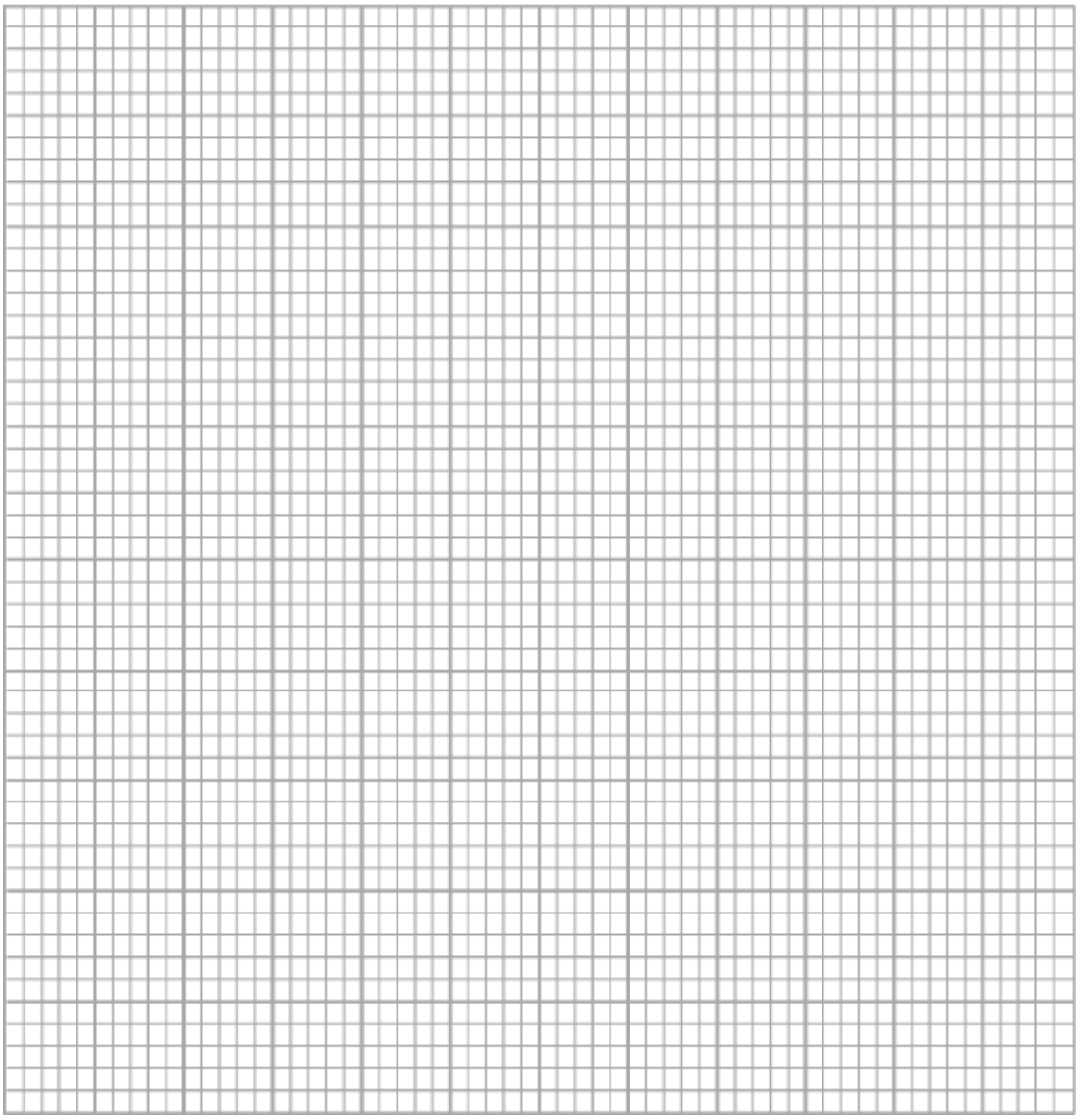
3. Draw a phasor diagram of an unbalanced star connected load using values from Table 2. Show phasors for the line currents, line voltages and phase voltages. Use V_{AN} as the reference phasor and show the scale used - Scale 10 mm = _____.



4. Determine the neutral current by phasor addition. State whether I_N obtained by phasor is approximately equal to the value of I_N recorded in Table 2.



5. Draw a phasor diagram of a balanced star connected load without a neutral conductor connected, using the values from Table 3. Show phasors for the line currents, line voltages and phase voltages. Use V_{AS} as the reference phasor.



6. Draw a phasor diagram of an unbalanced star connected load without a neutral conductor connected, using the values from Table 4. Show phasors for the line current, line voltages and phase voltages. Use V_{AS} as the reference phasor.

7. If the neutral conductor supplying an unbalanced star connected load becomes open circuit, what is the effect on the load voltage and the load current?

	 *Feedback*	Have your teacher/trainer check your results are correct	Teacher/Trainer Initials and Date	√