

Practice Attitude QUIZ



Electrical and Electronic

Part 1: About this Electrical & Electronic Resource

QUIZ

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 the Electrical and Electronic industry.

This Practice Aptitude Quiz is neither a formal assessment tool nor a direct pre-requisite for any job application.

This quiz has been developed with the assistance of Industry and Registered Training Organisations based on the needs and requirements of the industry sector.

It focuses on literacy, numeracy, comprehension and problem solving questions contextualised to this specific industry.

This Practice Aptitude Quiz does not cover aspects such as general knowledge or complex problem solving or reasoning skills. The level of reading, writing and mathematical skills assessed by this quiz is equivalent to that of a young person at Year 10 level.

This resource can be used by a number of different organisations and people such as careers practitioners with young people, 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 this industry;
- > Provided to people to enable them to practice their skills before sitting an actual aptitude test;
- > Used by teachers as a guide to industry maths requirements at the entry point of this particular Australian Apprenticeship career path; and
- > Used by teachers as classroom based activities for students in Year 11 and 12 and VET Business-centred studies.

The quiz should be able to be completed in approximately 1 hour and 45 minutes.

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.

Calculators may be used to complete this practice assessment.

Answers are located at the end of the quiz.

Electrical and Electronics Career, Occupational Information and Job Hunting Resources

Information and links on the industry, careers, job prospects as well as career websites and job hunting resources can be found at www.aapathways.com.au/Career-Resources.

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:

- > Search for your local Australian Apprenticeships Centre - www.aapathways.com.au/aac
- > Find a local Group Training Organisation - www.grouptraining.com.au/Find/find_gto.html
- > 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/default.aspx

Section 1 - Literacy, Reading and Comprehension

1. Read the following media release then answer the questions that follow.

4 April 2011

More maths and physics at school says electrical industry. (Source: [NECA press release](#))

Today, peak Australian electrical industry body, the National Electrical and Communications Association (NECA), supported calls to place a renewed focus on maths and physics at secondary school.

NECA was responding to an Industry Skills Council that said the average result in some apprentice tests involving maths and physics was 57% compared to 70% in previous years.

NECA chief executive officer, Mr James Tinslay, said while the electrical industry was attracting large numbers of apprentices it is still important for the next generation of apprentices to have solid numeracy skills when they leave school and not rely on tertiary education to fill the void.

“NECA has experienced record applications and completion of apprenticeships in its group training companies throughout Australia. It is promising to see so many young people making a career out of learning a trade but it is not surprising when you consider the massive opportunities in the industry,” Mr Tinslay said.

“As the number of new apprenticeships grow to help manage skill shortages in the electrical and communications industry, it is important that vocational training focus on workplace skills and not substitute for schooling.”

With large infrastructure projects such as the National Broadband Network (NBN) and the boom in mining operations in Australia, it is a great time to begin a career in the electrical industry.

“The industry will continue to grow and NECA expects to see more apprentices begin their careers in the coming years. There can be a gap between year 10, year 12 and entry levels of maths and physics required to undertake an electrical apprenticeship, and this needs addressing.

“NECA supports calls for a renewed focus on these skills at secondary school to help students prepare for a career in the electrical and communications industry,” Mr Tinslay said.

- a. What does NECA stand for?

b. What does NECA support?

c. What two projects or activities are providing career opportunities in the electrical industry?

d. What two subjects should vocational training focus on in secondary schools, in the opinion of NECA?

2. Occupational Health and Safety (OHS)

There are agencies in each State and Territory whose primary role is to promote and encourage safe, fair and productive working lives by working with employers, employees, unions and industry representatives. These agencies are responsible for administering industrial relations (IR) legislation and managing OHS functions in each state or territory.

For example, SafeWork SA is South Australia's occupational health, safety and welfare (OHS) agency. The following extract is from the SafeWork SA website – www.safework.sa.gov.au

Read the extract and answer the questions on page 13.

Hierarchy of control measures

The hierarchy of control is a sequence of options which offer you a number of ways to approach the hazard control process. Everyone in the workplace must adhere to the OHS policies and procedures. Here is a list of some OHS policies and procedures, with typical examples.

Eliminate the hazard:

- Remove hazardous electrical plant from the workplace;
- Cease in-house operations of hazardous work.

If this is not practical, then...

Substitute the hazard with a lesser risk:

- Use low voltage electrical plant;
- Substitute movable electrical plant for fixed.

If this is not practical, then...

Isolate the hazard:

- Place hazardous electrical plant in enclosures with restricted access;
- Place out-of-service tags on plant.

If this is not practical, then...

Use engineering controls:

- Use RCDs (safety switches) to protect socket outlets which supply electrical plant.

If this is not practical, then...

Use administrative controls:

- Perform regular inspection and tests on electrical plant and electrical installations;
- Implement safe work practices, instruction and training.

If this is not practical, then...

Use Personal Protective Equipment (PPE):

- Use rubber mats, insulated gloves, eye protection, boots, and head gear (also to be used in conjunction with above measures).

Examples of some Personal Protective Equipment (PPE) and safety signs that may be used in the Electrical Trades:

Gloves



Photo A

Breathing Mask



Photo B

Goggles



Photo C

Non-conductive Tools



Photo D



Sign A



Sign B



Sign C

Answer the following questions.

- a. Where does Personal Protective Equipment stand on the hierarchy of control?

- b. How do you eliminate a hazard?

- c. What are RCDs and why are they used?

- d. What is the role of each state and territory OHS agency?

- e. Name at least two PPE items to use when installing a light fitting overhead.

Section 2 – Mathematics

Numbers (Scientific Notation, Rounding, Estimating)

1. From the list of numbers below, select the one which is a:

$\frac{3}{8}$	35°	75%
5:4	16.37	$3\frac{1}{4}$

- a. Percentage _____
- b. Decimal number _____
- c. Fraction _____
- d. Mixed number _____
- e. Ratio _____
- f. Angle _____

2. Arrange in ascending order (from smallest to largest):

4 - 2 $\frac{1}{2}$ 3.7 0 - 8

3. Write in descending order:

$\frac{1}{4}$ $\frac{2}{3}$ 0.3

4. Express the following in scientific notation:

- a. 17,601 _____
- b. 729,123 _____
- c. 0.00015 _____
- d. 12.72 _____

5. Calculate the following:

- a. 10^2 _____
- b. 3^3 _____
- c. $\sqrt{36}$ _____
- d. $(\sqrt{9})^2$ _____

Arithmetic (Addition, Subtraction, Multiplication, Division)

6. Find the total of:

- a. \$2, \$21.45 and \$8.23 _____
- b. 18.32, 471.019 and 315 _____

7. Subtract:

- a. 5,218 - 1,784 _____
- b. 43.18 - 29.461 _____

8. Multiply:

- a. 6.87 by 10 _____
- b. 13.8 by 3 _____
- c. 46.2 by 8.5 _____

9. Divide:

- a. 3.45 by 10 _____
- b. 3,024 by 14 _____
- c. 56.2 by 0.2 _____

10. Simplify:

- a. $2 + 3 \times 4$ _____
- b. $4 - 10 \div 2$ _____
- c. $\frac{50 + 50}{2 \times 25}$ _____
- d. $(16 - 5) \times 3$ _____

Fractions

11. Add the following:

- a. $\frac{1}{4}$ and $\frac{1}{2}$ _____
- b. $\frac{2}{9}$ and $\frac{5}{6}$ _____
- c. $3\frac{1}{4}$ and $\frac{1}{8}$ _____

12. Subtract the following:

a. $\frac{5}{6} - \frac{1}{4}$

b. $2\frac{1}{14} - \frac{4}{7}$

Percentages

13. Evaluate the following:

a. 10% of \$44

b. 25% of 12.84

14. Michelle is a first year apprentice who earns \$500 a week as an apprentice electrician. She gets a pay rise of 5%. What is her new wage?

15. An article bought for \$250 is sold for \$375. Find:

a. The profit in dollars.

b. The profit as a percentage of the cost price.

16. Jonas, an electrician, buys the following from an electrical wholesaler: cable \$215; power points \$95; and fixings \$8. Jonas receives a 10% trade discount.

a. How much would Jonas pay with no discount?

b. How much would Jonas pay with discount?

c. How much has Jonas saved?

17. Barry scored 80% in an exam. There were 25 questions.

a. How many questions did Barry get right?

b. How many questions did Barry get wrong?

18. What percentage is 30 out of 50?

19. Electrical goods are subject to a goods and services tax (GST) of 10% of the sale price. If a refrigerator's pre-tax price is \$850:

a. What is the tax?

b. What is the selling price?

20. The efficiency of a machine is rated at 70%. If the input to the machine is 200 watts, what is the output power available?

Algebra

21. Remove the brackets and simplify the following:

a. $(2x + y) - (x - 4y)$

b. $(3a - b) - (2a - 3b)$

22. If $P = F/A$ find P, if $F = 60$ and $A = 20$?

23. Re-arrange the following formulae to make the letter in brackets the subject of the formula:

a. $P = VI$ (V)

b. $P = \frac{\pi Q n}{30}$ (Q)

24. The formula for working out the voltage is $V = E - iR$. Re-arrange the formula to:

a. Make E the subject

b. Make R the subject

Ratio

25. The ratio of a diameter of 'pulley A' to 'pulley B' is 4.5 to 2. If 'pulley A' has a diameter of 450 mm what is the diameter of 'pulley B'?

26. What is the ratio of the number of light bulbs to double power points?



27. The mass of two resistor boxes are in the ratio of 2:5. The smaller box has a mass of 20 kg. What is the mass of the larger box?

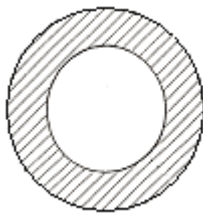
Conversions

28. Convert 5 amps to milliamps (mA).

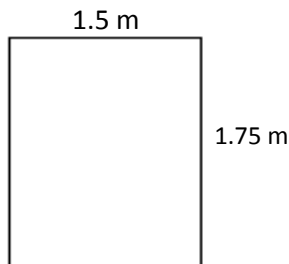
29. Convert 12k ohms to ohms (Ω).

Perimeter, Area, Volume

30. A large washer has an outer radius of 10 mm and a hole with a diameter of 14 mm. What is the area of the washer? (Use $\pi = 3.14$)



31. Calculate the area of the solar panel which has a base length of 1.5 m and a height of 1.75 m.



Problem Solving

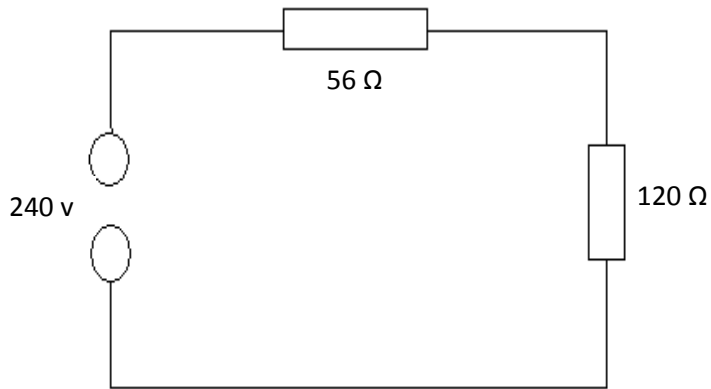
32. An electric car is travelling at 60 km per hour, how far will it travel in 3 hours?

33. Two numbers add up to 40. Find the other number if one of the numbers is 15.

34. Meeha is a data-cabling technician. She receives a gross salary of \$45,000 a year. How much does she receive each fortnight?

35. A simple circuit has two resistors, one 56 ohms and the other is 120 ohms, and is connected to a supply voltage of 240 volts.

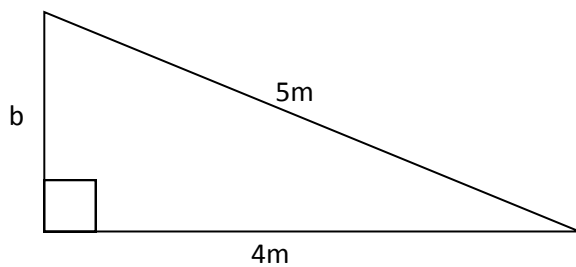
Note:



P = Power
I = Current
R = Resistance
V = Voltage

- a. Calculate the current flowing (in amps) in the circuit using the formula $V=IR$. Correct to 3 decimal places.
- _____
- b. Calculate the total power (in watts) dissipated using the formula $P = I^2R$. For 'I', use the answer you calculated in the previous question. Correct to 2 decimal places.
- _____

36. A right angled triangle has the following dimensions. Using Pythagoras' Theorem find the missing side (b).



37. The perimeter of a room needs to be wired. The room measures 3.2 m x 3.2 m.

- a. How much wire is required to go around the outside of 3 of the walls?
- _____
- b. If Thermo Plastic Sheathed (TPS), Orange Circular and Category 6 (cat6) cable are all to be used when wiring the 3 walls, what is the total amount of wire required?
- _____

Section 1 - Literacy, Reading & Comprehension Questions

1.
 - a. National Electrical and Communications Association
 - b. To place a renewed focus on maths and physics at secondary school.
 - c. Large infrastructure projects such as the National Broadband Network (NBN) and the boom in mining operations in Australia.
 - d. Maths and Physics
2.
 - a. PPE stands last on the hierarchy of control.
 - b. Eliminate a hazard by removing hazardous electrical plant from the workplace and ceasing in-house operations of hazardous work.
 - c. RCDs are safety switches used to protect socket outlets which supply electrical plant.
 - d. The main role of agencies is to promote and encourage safe, fair and productive working lives by working with employers, employees, unions and industry representatives.
 - e. Foot protection, hard hat, eye protection, breathing protection, hand protection, non-conductive ladder, non-conductive hand tools.

Section 2 - Mathematics

1.
 - a. 75%
 - b. 16.37
 - c. $\frac{3}{8}$
 - d. $3\frac{1}{4}$
 - e. 5:4
 - f. 35°
2. -8, -2, 0, $\frac{1}{2}$, 3.7, 4
3. $\frac{2}{3}$, 0.3, $\frac{1}{4}$
4.
 - a. 1.7601×10^{-4}
 - b. 7.29123×10^5
 - c. 1.5×10^{-4}
 - d. 1.272×10^1
5.
 - a. 100
 - b. 27
 - c. 6
 - d. 9
6.
 - a. \$31.68
 - b. 804.339
7.
 - a. 3,434
 - b. 13.719
8.
 - a. 68.7
 - b. 41.4
 - c. 392.7
9.
 - a. 0.345
 - b. 216
 - c. 281
10.
 - a. 14
 - b. -1
 - c. 2
 - d. 33
11.
 - a. $\frac{3}{4}$
 - b. $\frac{19}{18}$ or $1\frac{1}{18}$
 - c. $\frac{27}{8}$ or $3\frac{3}{8}$
12.
 - a. $\frac{7}{12}$
 - b. $1\frac{1}{2}$
13.
 - a. \$4.40
 - b. 3.21
14. \$525
15.
 - a. \$125
 - b. 50%

QUIZ

16. a. \$318 b. \$286.20 c. \$31.80
17. a. 20 b. 5
18. 60%
19. a. \$85 b. \$935
20. 140 watts
21. a. $x + 5y$ b. $a + 2b$
22. $P = 3$
23. a. $V = \frac{P}{I}$ b. $Q = \frac{30P}{\pi n}$
24. a. $E = V + i R$ b. $R = \frac{E - V}{I}$
25. 200 mm
26. 2:3
27. 50 kg
28. 5,000 mA
29. 12,000 Ω (Ohms)
30. 160.14 mm²
31. 2.625 m²
32. 180 km
33. 25
34. \$1,730.77
35. a. 1.364 amps b. 327.45 W
36. 3 m
37. a. 9.6 m b. 28.8 m

Contributions

This Practice Aptitude Quiz would not have been possible without the support of the State Government of South Australia, Group Training Australia (SA) Inc and its members.

This Practice Aptitude Quiz was developed by:



Group Training South Australia - www.gtasa.com.au

Group Training Australia (SA) (GTA SA) is a network of independent not for profit organisations located in metropolitan Adelaide and all major population centres throughout the state. These organisations operate on either an industry or regional basis and collectively they provide employment for in excess of 4,000 apprentices and trainees.

GTA SA members are:

- > AFL SportsReady - www.aflsportsready.com.au
- > ATEC Group Training - www.atec.asn.au
- > Australian Industry Group Training Services - www.aigts.com.au
- > Career Employment Group - www.ceg.net.au
- > Group Training Employment - www.gte.org.au
- > Hospitality Group Training - www.hospitalitysa.com.au
- > Maxima Group Training - www.maxima.com.au
- > Motor Trade Association Group Training Scheme - www.mta-sa.asn.au
- > Murraylands Training & Employment Association of SA Inc - www.mteasa.com.au
- > PEER VEET - www.peer.com.au
- > Plumbing Industry Association Group Training - www.piasa.com.au
- > SMGT Total Employment Solutions - www.smgt.com.au
- > Statewide Group Training - Torrensville - www.statewidegrouptraining.com.au
- > Trainee and Apprentice Training Service Inc (TAPS) - www.tapssa.com.au

With specific thanks to:



PEER VEET - www.peer.com.au

PEER VEET is one of the leading not for profit Group Training Organisations and trade based Registered Training Organisations based in South Australia.

We are dedicated to delivering the highest standards of service to our clients through quality Training and Employment.

Our employment division provide the Building and Construction industries with apprentices and trainees in Plumbing, Electrical, Refrigeration and Air Conditioning, Data Communications, Security Systems Installations and Business Administration.

Our training services division provide Off-the-Job Training and Assessment for a range of Nationally Accredited Qualifications, Units of Competency and industry tailored courses that are specified for the group of trade-based and trade related occupations



Australian Apprenticeships Pathways Website - www.aapathways.com.au

This website provides sample Australian Apprenticeships job descriptions and links to more Australian Apprenticeships information and resources. The site is funded by the Department of Industry.



The Career Education Association of Victoria - www.ceav.vic.edu.au

The CEAV is the Victorian peak body for secondary school career practitioners, work experience coordinators, VET coordinators and MIPS coordinators. The CEAV provides professional development opportunities for members and also works with business, industry, and the education and training sector.



Industry Training Australia P/L - www.itaust.com.au

Industry Training Australia (ITA) delivers consultancy services to government and non-government organisations in the education and training sector. ITA develops and delivers information and communication services, including the Australian Apprenticeships Pathways website, for service provider networks and the general public.

For enquiries about this Practice Aptitude Quiz contact the Australian Apprenticeships and Traineeships Information Service on 1800 338 022.