Practice Aptitude Quiz

Telecommunications

Part 1:   About this Resource

Guidance

The 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 Telecommunications Industry.

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

This quiz has been developed with the assistance of industry, TAFE and the secondary school sector as a careers resource.

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

The quiz can be utilised by numerous organisations and people such as careers practitioners working with young people, Group Training Organisations and Job Services Australia providers working 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 Mathematics teachers as a guide to industry maths requirements at the entry point of this particular Australian Apprenticeship;

> Used by teachers as classroom based activities for students in Year 11 and 12 VET studies.

The level of reading, writing and mathematical skills assessed by this quiz is equivalent to that of a typical young person at Year 11 level.

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.

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

Calculators may be used to complete this practice exercise.

Answers are located at the end of the quiz.

Occupational Information and Job Hunting Resources

Information and links on the Telecommunications 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

Part 2:   The Quiz

Section 1 - Literacy, Reading and Comprehension

Spelling

1. **Rearrange the following words in alphabetical order:**

Telecommunications	
Electronics	
Wireless	
Solar	
Cable	

2. **Explain what you understand by the following terms:**

    a. **Telecommunications**

    _____

    _____

    _____

    _____

    _____

    b. **Cable**

    _____

    _____

    _____

    _____

    c. **Wireless**

    _____

    _____

    _____

    _____

3. **The following text has 10 spelling errors. Correct those errors and list them in the order they appear in the text. List the mistakes below, as you find them.**

Renewable energy derived from naturel processes such as sunlite, wind and tides are repleneshed constently. Renewable sistems that convurt energy to electricity include solar pannels and wind turbines. Electrical energy produced is importent and must not be waisted, therefore bateries can be used to store that energy for later use.

Comprehension

Read the following article then answer questions 4 to 12.

Information and Communication Technology (ICT)

Telecommunication is the transmission of messages, over significant distances, for the purpose of communication. Today, telecommunications is a complex network of mobile phone technology, internet, wireless and computer networking more commonly referred to as Information and Communication Technology (ICT).

A number of key concepts in modern telecommunication systems are discussed below.

A basic telecommunication system consists of three primary elements that are always present in some form, and they are:

- A sender or transmitter that takes information and converts it to a communication signal;
- A transmission medium carries the communication signal using either electrical, radio or optical technologies; and
- A receiver that takes the communication signal from the transmission medium and converts it back into usable information.

Wireless devices such as mobile phones or Bluetooth hands-free sets communicate using radio waves whilst other devices such as CD players and remote control units communicate using optical light sources such as a laser or a LED.

ICT systems use either analog or digital communications signals. For an analog signal, the signal varies continuously in intensity with respect to the information. Modern communication systems use digital signals where the information is encoded as a set of discrete values (for example, a set of 'on' or 'off' states and 'light' or 'no light'). Noise degrades an analog signal during transmission and as such the noise becomes part of the analog signal. However, noise can easily be removed from digital signals during processing, making this relative immunity to noise a key advantage of digital signals over analog signals.

Telecommunication has significant economic, social and cultural impacts on modern society.

- **Economic impact:** Companies or individuals use telecommunications to help build their global business using customised websites. Relatively poor communities use telecommunication to their advantage. Isolated villagers in Bangladesh use mobile phones to speak directly to wholesalers and arrange a better price for their goods. Similarly coffee growers in Africa share mobile phones to follow hourly variations in coffee prices and sell at the best price.

- **Social impact:** Use of e-mail and SMS are fast becoming redundant among younger users as a means of communications. The internet enables individuals to use social networking websites such as Facebook and Twitter to socialise and interact with friends and relatives by posting photographs, events and profiles for others to see. Sites like LinkedIn foster commercial and business connections. YouTube and Instagram specialise in users' videos and photographs.

  Voice-over-Internet Protocol (VoIP), a form of internet telephony which is fast replacing traditional land line telephone, has become as easy and as convenient to use as a normal telephone in order to communicate. The benefit is that, as the internet carries the voice traffic, VoIP can be free or cost much less than a traditional telephone call, especially over long distances.

- **Cultural impact:** In cultural terms, telecommunication has increased the public's ability to access music and live entertainment more affordably from their own home using the internet. Internet TV (IPTV) is becoming more common particularly with better broadband availability.

  Telecommunication has also transformed the way people receive their news. Many people use the Internet o access news, weather and sports reports, to plan and book vacations and to find out more about their interests. Major events and natural disasters across the world are being televised or made available on the internet thus keeping us informed very soon after the event.

4. **What type of communication is most commonly used today? (Circle the correct response)**

   a. Telegram

   b. Internet

   c. Smokesignals

   d. Posted letters

5. **Circle the most appropriate response for the technical advantage of digital signalling over analog signalling.**

   a. Cheaper

   b. Faster

   c. More immune to noise

   d. Less immune to noise

QUIZ

6. **What medium is used by mobile phones to communicate? (Circle the correct response)**

   a. Optical device

   b. Laser device

   c. LED source

   d. Radio waves

7. **What are the three basic elements that are common in most telecommunications systems?**

   1. _____

   2. _____

   3. _____

8. **Name two types of light sources stated that are used in optical communications.**

   1. _____

   2. _____

9. **Name the three types of significant impacts that telecommunication has brought on modern society.**

   1. _____

   2. _____

   3. _____

10. **What type of network is used by VoIP calls to replace traditional telephone calls?**

    _____

11. **What is the name of the social networking website commonly used for commercial and business connections?**

    _____

12. **Name two types of communications that are becoming less common among young people in recent times.**

    1. _____

    2. _____

Section 2 - Mathematics

Calculators may be used

Numbers (Rounding, Scientific Notation, Evaluation)

1. **Round the following:**

    a. 52.28565 to two decimal places _____

    b. 4568.5 x 10^{-4} to two decimal places _____

    c. 646.75 to the nearest tens _____

    d. 329 to the nearest hundreds _____

2. **Rearrange in ascending order (from smallest to largest)**

5	
-3	
½	
4.3	
0	
-7	

3. **Which of the following represents the number 62,000,000,000 in scientific notation? (Circle the correct response)**

    a. 62×10^{10}

    b. 6.2×10^{10}

    c. 6.2×10^{-10}

    d. 0.62×10^{10}

4. **Evaluate the following:**

    a. 10^2 _____

    b. 5^3 _____

    c. $64^{1/2}$ _____

    d. $(\sqrt{16})^2$ _____

Arithmetic (Addition, Subtraction, Multiplication, Division)

5. **Solve the following:**

    a. 4562 - 1287   _____

    b. 86 + 22 - 16   _____

    c. - 25 + 82 + 5   _____

6. **Multiply the following:**

    a. 53.86 by 10   _____

    b. 25.4 by 3   _____

    c. 128.5 by 10^{-2} _____

7. **Divide the following:**

    a. 2.56 by 10   _____

    b. 1024 by 8   _____

    c. 256 by 4   _____

8. **Solve the following:**

    a. 3 + 6 x 4   _____

    b. 22 - 80 ÷ 4   _____

    c. (25 + 50) ÷ (2 x 12.5)   _____

    d. (12 – 8) x 3   _____

9. **Two voltages add up to 120 Volts. One of the voltage measures 80 Volts, what is the voltage of the other?**

    _____

Fractions

10. **Solve and express your answers in fractions:**

    a. ¼ + ½   _____

    b. 2/9 + 5/6   _____

    c. 3¼ - 1/8   _____

11. **Evaluate the following:**

    a.   10% of $520   _____

    b.   25% of 120.8   _____

12. **As an apprentice Tania earns $520 per week and is awarded a pay rise of 5%. What is her new weekly wage?**

    _____

13. **The efficiency of a machine is rated at 80%. If the input is 200 Watts, what is the available output power in Watts?**

    _____

14. **A satellite dish receives 300 milliwatts of power on a clear day. If during heavy rain it only receives 120 milliwatts of power, calculate the percentage drop in power on a rainy day.**

    _____

Decimals

15. **Express as a decimal.**

    a.   3/5   _____

    b.   26.25 + 54.5 − 30.3   _____

    c.   7 x 2 ÷ 5   _____

    d.   10 ÷ 4 + 3÷2 + 5÷4   _____

Algebra

16. **Remove the brackets and simplify the following:**

    a.   (2x + 3y) − (x − 2y)   _____

    b.   (4a − 2b) − (5b − 2a)   _____

17. **A mathematical relationship is expressed as *I = V/R*, where *I* is electric current in Amps, *V* is voltage in Volts and *R* is resistance in Ohms.**
Find *I* if *R* = 5 Ohms and *V* = 35 Volts.

    _____

18. The formula for working out voltage in an electronic circuit is *V = E - IR*.
Rearrange the formula to make each of the following the subject of the equation:

a. *E* _____

b. *R* _____

c. *I* _____

Ratios

19. A cube has a volume of 8 cubic metres. If each side of the cube is doubled in length, what is its new volume in cubic metres?

_____

20. Dominic helps install a renewable energy system constantly generating 800 Watts of power which is shared between a wind turbine and a solar panel. Calculate the power generated by the solar panel if its output power ratio compared to that of the wind turbine is:

a. 4:1 at the peak of the day _____

b. 1:5 late in the afternoon _____

Conversions

21. Convert the following:

a. 6.2 km to metres _____

b. 15 Amps to milliamps _____

c. 250 Mega bits per second to kilobits per second _____

22. Gabe's mobile phone plan charges 25 cents for every 20 seconds (or part thereof) when he makes a call. What is he charged when making a call continuously for 1 ½ minutes at the prescribed charge rate?

_____

Section 3 - Problem Solving and Specific Knowledge

Problem Solving

1. Franco is part of a mobile phone antenna installation team that has to install a repeater antenna away from a main antenna to improve radio reception. To get around obstructions from the main antenna, they drive 16 km South, then 12 km West, then 4 km South again and then 6 km East before finally driving 12 km North to mount the repeater antenna. What is the distance (in km) in a straight line is the repeater mounted from the main antenna?

2. A telecommunications cable on a cable drum ready for installation has a specified resistance of 4 Ohms/100m of cable.
   Estimate the length of the cable if the total cable resistance is measured as 14 Ohms.

3. A television antenna is mounted on a flat roof using a metal antenna mast and secured with a guy wire for stabilisation. The guy wire is attached 4m up from the base of the mast and anchored 3 m away along the roof top from the base of the mast as shown below.
   Calculate the length of the guy wire required.

TV Antenna

NOTE: Diagram is not drawn to scale

GUY WIRE ?m

4 m

FLAT ROOF TOP

3 m
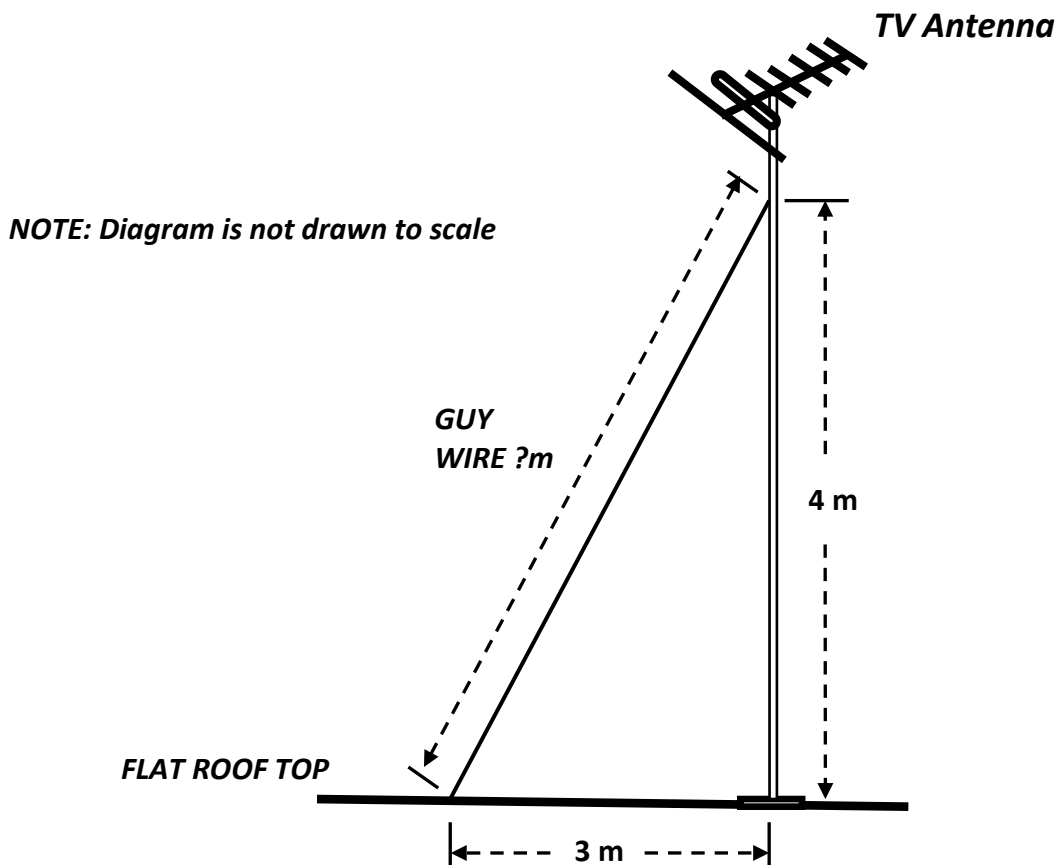
4. Three gears used for antenna positioning are meshed together as shown. When Gear A is rotated clockwise as shown, determine the spin direction of Gears B and C. (Circle the correct combination.)

   a. B & C rotate clockwise.

   b. B & C rotate anticlockwise.

   c. B rotates clockwise & C rotates anticlockwise.

   d. B rotates anticlockwise & C rotates clockwise.
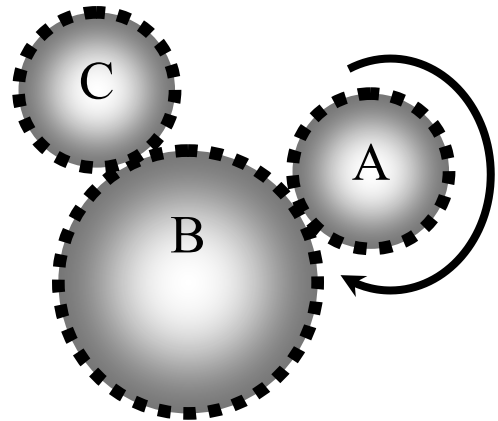
NOTE: Diagram is not drawn to scale

5. The surface of a roof facing north is to be fitted with solar panels to generate electricity. The roof measurements shown below are indicated in metres

   NOTE: Diagram is not drawn to scale

   2 m   10 m   4 m
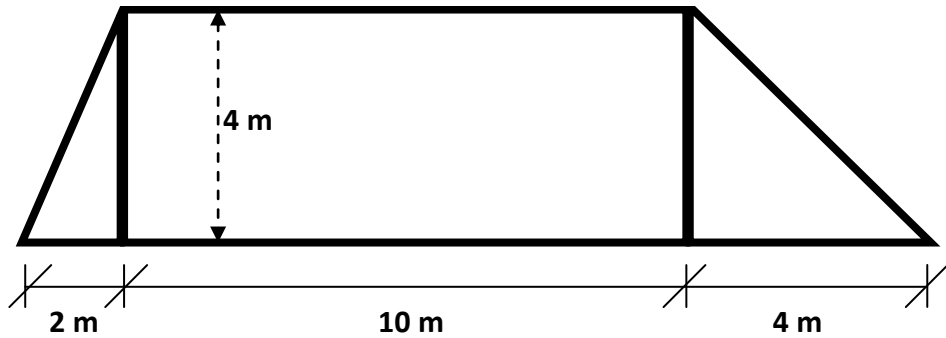
   a. Calculate the surface area of the roof in square metres.

   _____

   _____

   b. The effective usable roof surface for panel mounting is 60%.
      Calculate the maximum number of solar panels that can be mounted if each solar panel has a surface area of 2.44 square metres.

   _____

   _____

Specific Knowledge

6. **Verify this statement *"a AA cell and a AAA cell have the same voltage"* when measured. (Circle the correct response.)**

    a. TRUE

    b. FALSE – "AAA" cell has larger voltage

    c. FALSE – "AA" cell has larger voltage

7. **An example of an electrical insulator is: (Circle the correct response.)**

    a. Brass

    b. Copper

    c. Plastic

    d. Acid

8. **The term LED device refers to: (Circle the correct response.)**

    a. Led Zeppelin

    b. Lunar Elliptical Dome

    c. Light Electric Display

    d. Light Emitting Diode

9. **The light output from a fibre or a device using a laser source can be dangerous. (Circle the correct response.)**

    a. If the light is not visible

    b. If the light is visible

    c. Because the beam is concentrated and intense

    d. Because it is expensive

10. **The microwave energy from a telecommunications microwave radio system can be dangerous. (Circle the correct response.)**

    a. Because the energy not visible

    b. Because it uses harmful radio waves

    c. Because it uses harmful optical waves

    d. Because it is expensive

Section 1 - Literacy, Reading and Comprehension

Spelling

1. Cable; Electronics; Solar; Telecommunications; Wireless

2. **Answers should include:**

   a. Telecommunications is a means of communications by the transmission of messages or information over significant distances between two parties.

   b. Cable is the physical connection that permits electrical transmission of information between the sender and receiver. Can be a combination of wire cabling, fibre optic cabling and co-axial cabling.

   c. Wireless is the means of telecommunications transmission whereby no physical means are used. The transmission medium can be radio waves, infrared or optical communications in free space.

3. naturel - natural; sunlite - sunlight; repleneshed - replenished; constently - constantly; sistems - systems; convurt - convert; pannels - panels; importent - important; waisted - wasted; bateries - batteries.

Comprehension

4. b. Internet

5. c. More immune to noise

6. d. Radio waves

7. Sender or Transmitter; Transmission medium; Receiver

8. Laser and LED

9. Economic, social and cultural

10. Internet

11. LinkedIn

12. E-mail and SMS

Section 2 - Mathematics

Numbers (Rounding, Scientific Notation, Evaluation)

1. **a.** 52.29   **b.** 0.46   **c.** 650   **d.** 300
2. -7   -3   0   ½   4.3   5
3. **b.** 6.2×10^{10}
4. **a.** 100   **b.** 125   **c.** 8   **d.** 16   *(from √16 = 4, and 4^2 = 16)*

Arithmetic (Addition, Subtraction, Multiplication, Division)

5. **a.** 3275   **b.** 92   **c.** 62
6. **a.** 538.6   **b.** 76.2   **c.** 1.285
7. **a.** 0.256   **b.** 128   **c.** 64
8. **a.** 27   **b.** 2   **c.** 3   **d.** 12
9. 40 Volts

Fractions

10. **a.** ¾   **b.** 19/18 or $1^{1/18}$ **c.** $3^{1/8}$

Percentages

11. **a.** $52   **b.** 30.2
12. $546   (*from 1.05 x $520 = $546*)
13. 160 Watts   (*from 0.8 x 200W= 160W*)
14. 60% drop in power   (*from: 180 mW of power drop; 180 ÷ 300 x 100% = 60%*)

Decimals

15. **a.** 0.6   **b.** 50.45   **c.** 2.8   **d.** 5.25

Algebra

16. **a.** $x + 5y$ **b.** $6a - 7b$
17. 7Amps
18. **a.** $E = V+IR$ **b.** $R = (E-V)/I$ **c.** $I = (E-V)/R$

Ratios

19. 64 Cubic metres   (*from: 8 Cum cube has sides 2m long; with 4m sides, volume is 4^3 = 64 Cum*)
20. **a.** 640W *from 800 x 4 ÷ 5*   **b.** 133W *from 800 ÷ 6*

Conversions

21. **a.** 6,200 m   **b.** 15,000 mA   **c.** 250,000 kbps
22. $1.25 (*from: 1½ mins or 90 secs is 4½ x 20 sec timeslots. Therefore use 5 times the 25c charge per time slot*)

Section 3 - Problem Solving and Specific Knowledge

Problem Solving

1. 10 km away from the main antenna (*from: total distance in a southerly direction is 8 km and total distance in a westerly direction is 6 km. Using the 3-4-5 triangle or Pythagoras's theorem we get 10 km.*)
2. 350 metres (*from: 14 ÷ 4 x 100m*)
3. 5 metres (*from: using the 3-4-5 triangle or Pythagoras's theorem we get 5 m.*)
4. d. B rotates anticlockwise & C rotates clockwise
5. **a.** 52 square metres (*from: sum of all areas: (i) left triangle (4x2÷2 = 4 sqm);(ii) oblong (4x10 = 40 sqm) and (iii) right triangle (4x4÷2 = 8 sqm)*)
     b. 12 panels   (*from: 0.6 x 52 ÷ 2.44 = 12.8. Round down to 12 full panels*)

Specific Knowledge

6. **a.** TRUE   (*they have same cell voltage*)
7. **c.** Plastic   (*all others are electrical conductors*)
8. **d.** Light Emitting Diode
9. **c.** Because the beam is concentrated and intense
10. **b.** Because it uses harmful radio waves

Contributions

Australian Apprenticeships Pathways Website - www.aapathways.com.au
This website, part of the Australian Apprenticeships and Traineeships Information Service, provides sample Australian Apprenticeships job descriptions and links to more Australian Apprenticeships information and resources. The service is funded by the Department of Industry.

Innovation and Business Services Australia - www.ibsa.org.au
Innovation & Business Skills Australia (IBSA) is one of 12 Industry Skills Councils which have custodianship of all VET Education Training Packages. IBSA oversees 12 Training Packages in the following industry sectors: Financial Services, Education, Business Services, Cultural & Related Industries, Information & Communications Technology and Printing & Graphic Arts. IBSA works closely with industry, education and government to ensure that the qualifications in these sectors reflect real industry skill requirements and to build capability, professionalism, and innovative capacity in Australia's workforce.

TAFE NSW - www.tafensw.edu.au
TAFE NSW is Australia's leading provider of vocational education and training with more than 500,000 enrolments in NSW each year. Whether you're an individual looking for your first job, a promotion, a career change or a pathway to a degree or you're an employer seeking training solutions for your workforce, TAFE NSW can deliver a range of courses and services to suit your needs. Some programs are delivered Australia wide.

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.**