



Australian Government

A U S T R A L I A N
A P P R E N T I C E S H I P S

Your Life. Your Career. Your Future.

Telecommunications

Practice Aptitude Quiz

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Part 1: About this quiz

Use this quiz to prepare for an Apprenticeship in Telecommunications

This quiz:

- Is NOT a formal assessment tool or pre-requisite for any job application
- Shows key learning standards for the Telecommunications industry
- Has been developed with the help of industry leaders, TAFE and high schools

Quiz details

This quiz will:

- Take approximately 1 hour and 45 minutes to complete
- Ask you numeracy and literacy questions specific to the Telecommunications industry
- Assess your literacy and numeracy at a Year 11 standard
- Allow you to use a calculator
- Share correct answers at the end

Who should take this quiz?

You should complete this quiz if you:

- Are thinking about starting an Apprenticeship in Telecommunications
- Want to practise for a formal aptitude test

Need help with your literacy and numeracy skills?

If you want to improve your literacy and numeracy skills, reach out to any of the below:

- Australian Apprenticeship Support Network providers
- Your Registered Training Organisation when you start training
- Reading Writing Hotline:
1300 655 506
www.readingwritinghotline.edu.au
- Careers advisers and your teachers (if you're in high school)

More information about the Telecommunications industry

Visit www.yourcareer.gov.au/industries/j/information-media-and-telecommunications

On this page you'll be able to:

- See the most popular Telecommunications occupations
- Get general information and statistics about the industry
- Search for Telecommunications courses

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How to use this quiz

This is an interactive form that can be filled out on your computer.

You can either:

- Fill it out on your computer; OR
- Print it out; OR
- Write your answers down on paper as you go.

Use the answers section at the end of the quiz to see how you went.

How to complete this quiz on your computer

1. Download and save the quiz onto your computer
2. Open the file from your computer
3. Fill in the form using a keyboard and mouse

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Part 2: The Quiz

Section 1: Language and Literacy

1. Rearrange the following words in alphabetical order:

Telecommunications	
Electronics	
Wireless	
Solar	
Cable	

2. 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 replenished 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.

- | | |
|----------|-----------|
| 1. _____ | 2. _____ |
| 3. _____ | 4. _____ |
| 5. _____ | 6. _____ |
| 7. _____ | 8. _____ |
| 9. _____ | 10. _____ |

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Read the following article then answer questions 3 to 11.

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 analogue or digital communications signals. For an analogue 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 analogue signal during transmission and as such the noise becomes part of the analogue 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 analogue 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.

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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 to 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.

3. **What type of communication is most commonly used today? Select the correct response.**

Telegram

Internet

Smoke signals

Posted letters

4. **Select the most appropriate response for the technical advantage of digital signalling over analogue signalling:**

Cheaper

Faster

More immune to noise

Less immune to noise

5. **What medium is used by mobile phones to communicate? Select the correct response.**

Optical device

Laser device

LED source

Radio waves

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

1. _____
2. _____
3. _____

7. Name two types of light sources stated that are used in optical communications:

- 1.
- 2.

8. Name the three types of significant impacts that telecommunication has brought on modern society:

1. _____
2. _____
3. _____

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

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

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

1. _____
2. _____

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Section 2: Numeracy

Calculators may be used

1. Round the following:

a. 52.28565 to two decimal places

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

c. 646.75 to the nearest tens

d. 329 to the nearest hundreds

2. Rearrange in ascending order:

5	
-3	
$\frac{1}{2}$	
4.3	
0	
-7	

3. Which of the following represents the number 62,000,000,000 in scientific notation? Select the correct response.

62×10^{10}

6.2×10^{10}

6.2×10^{-10}

0.62×10^{10}

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4. Evaluate the following:

a. 10^2

b. 5^3

c. $64^{1/2}$

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

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. $3 + 6 \times 4$

b. $22 - 80 \div 4$

c. $(25 + 50) \div (2 \times 12.5)$

d. $(12 - 8) \times 3$

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

10. Solve and express your answers in fractions:

a. $\frac{1}{4} + \frac{1}{2}$

b. $\frac{2}{9} + \frac{5}{6}$

c. $3\frac{1}{4} - \frac{1}{8}$

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:

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15. Express the following as a decimal

a. $\frac{3}{5}$

b. $26.25 + 54.5 - 30.3$

c. $7 \times 2 \div 5$

d. $10 \div 4 + 3 \div 2 + 5 \div 4$

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

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?

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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

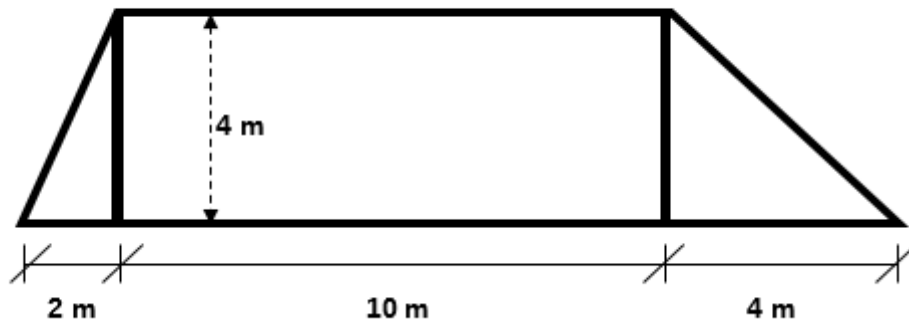
21. Convert the following:

- a. 6.2 km to metres
- b. 15 Amps to milliamps
- c. 250 Megabits 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?

23. 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

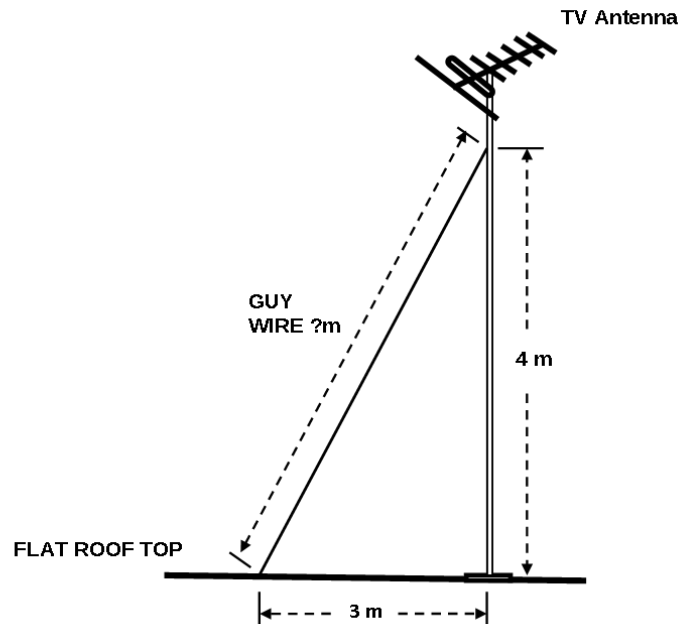


- a. Calculate the surface area of the roof in square metres:

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- 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:

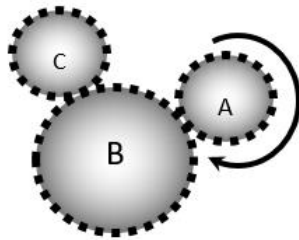
24. A television antenna is mounted on a flat roof using a metal antenna mast and secured with a guy wire for stabilisation. The guy wire is attached 4m up from the base of the mast and anchored 3 m away along the roof top from the base of the mast as shown below. Image below not to scale. Calculate the length of the guy wire required:



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Section 3: General Knowledge

1. 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. Select the correct answer below:



Note: Diagram is not drawn to scale

- B & C rotate clockwise
- B & C rotate anticlockwise
- B rotates clockwise & C rotates anticlockwise
- B rotates anticlockwise & C rotates clockwise
2. 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?
3. 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:
4. Verify this statement: *“a AA cell and a AAA cell have the same voltage”* when measured. Select the correct response

TRUE

FALSE – “AAA” cell has larger voltage

FALSE – “AA” cell has larger voltage

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5. Select which of the following is an example of an electrical insulator:

Brass

Copper

Plastic

Acid

6. Select the correct definition for the term 'LED':

Led Zeppelin

Lunar Elliptical Dome

Light Electric Display

Light Emitting Diode

7. The light output from a fibre or a device using a laser source can be dangerous. Select the correct reason why this statement is true:

If the light is not visible

If the light is visible

Because the beam is concentrated and intense

Because it is expensive

8. The microwave energy from a telecommunications microwave radio system can be dangerous. Select the correct reason why this statement is true:

Because the energy not visible

Because it uses harmful radio waves

Because it uses harmful optical waves

Because it is expensive

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9. Define the following terms:

a. Telecommunications:

b. Cable:

c. Wireless:

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ANSWERS

Section 1: Language and Literacy

1. Cable; Electronics; Solar; Telecommunications; Wireless
2. naturel - natural; sunlite - sunlight; replenished - replenished; constantly - constantly; sistems - systems; convurt - convert; pannels - panels; importent - important; waisted - wasted; bateries - batteries.
3. Internet
4. More immune to noise
5. Radio waves
6. Sender or Transmitter; Transmission medium; Receiver
7. Laser and LED
8. Economic, social and cultural
9. Internet
10. LinkedIn
11. E-mail and SMS

Section 2: Numeracy

1. a. 52.29 b. 0.46 c. 650 d. 300
2. -7 -3 0 $\frac{1}{2}$ 4.3 5
3. 6.2×10^{10}
4. a. 100 b. 125 c. 8 d. 16
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
10. a. $\frac{3}{4}$ b. $\frac{19}{18}$ or $1\frac{1}{18}$ c. $3\frac{1}{8}$
11. a. \$52 b. 30.2
12. \$546 (from $1.05 \times \$520 = \546)
13. 160 Watts (from $0.8 \times 200W = 160W$)
14. 60% drop in power (from: 180 mW of power drop; $180 \div 300 \times 100\% = 60\%$)
15. a. 0.6 b. 50.45 c. 2.8 d. 5.25
16. a. $x + 5y$ b. $6a - 7b$
17. 7 Amps
18. a. $E = V + IR$ b. $R = (E - V)/I$ c. $I = (E - V)/R$
19. 64 Cubic metres (from: 8 cubic m cube has sides 2m long; with 4m sides, volume is $4^3 = 64$ Cubic meters)

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20. a. 640W (from $800 \times 4 \div 5$) b. 133W (from $800 \div 6$)
21. a. 6200 m b. 15000 mA c. 250000 kbps
22. \$1.25 (from: $1\frac{1}{2}$ mins or 90 secs is $4\frac{1}{2} \times 20$ sec timeslots.)
23. a. 52 square metres from: sum of all areas: (i) left triangle ($4 \times 2 \div 2 = 4$ sqm); (ii) oblong ($4 \times 10 = 40$ sqm) and (iii) right triangle ($4 \times 4 \div 2 = 8$ sqm)
b. 12 panels (from: $0.6 \times 52 \div 2.44 = 12.8$. Round down to 12 full panels)
24. 5 metres (from: using the 3-4-5 triangle or Pythagoras's theorem we get 5 m.)

Section 3: General Knowledge

1. B rotates anticlockwise & C rotates clockwise
2. 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.)
3. 350 metres (from: $14 \div 4 \times 100$ m)
4. TRUE
5. Plastic (all others are electrical conductors)
6. Light Emitting Diode
7. Because the beam is concentrated and intense
8. Because it uses harmful radio waves
9. 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.