



Practice Aptitude Assessment  
for  
Automotive Industry  
(Apprentice Mechanics)



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Group Training Australia (SA) Inc.  
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## Acknowledgements

This practice aptitude assessment would not have been possible without the support of the State Government, Group Training Australia (SA) Inc and the support and expertise of the many people listed below. I would especially like to thank Jerry Nowak for the tireless amount of work and effort he has put into the maths component of this project. I under-estimated the size of the task, however Jerry was so keen to see the project through he put in countless hours over and above what he was required to give, his supreme dedication and his great passion enabled me to produce a much needed resource for students contemplating a career in the trades.

I am sure that over the years many thousands of students will benefit from Jerry's dedication to the project.

Another special mention must go to Jane Harvey. Jane was the person who initially planted the seed in respect of developing an aid to assist students prepare themselves for interviews and assessments in the trade areas. Jane has been there during the planning and programming stages, to assisting with the coordination of the many other people who have assisted in some form in the development of this resource, to grouping the maths examples under appropriate headings and preparing the answers. Jane has fought with me every inch of the way, through thick and thin at times, to produce a quality product which we hope will fill a vast void that has been identified in this sector of the VET/Career education pathway of students.

Department of Education and Children's Services

Premier's Industry Awards for Teachers of Science and Mathematics

Department of Further Education Employment Science and Technology

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## Guidance

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

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.

This assessment is intended to prepare people who may be required to sit an aptitude test as part of an interview and assessment process for a job vacancy, such as an apprenticeship. The assessment can be used by a number of different organisations or people such as Group Training Organisations, Career Education Teachers, Mathematics Teachers within schools or New Apprenticeship Centres.

The assessment can be:

- provided to individual people to enable them to practice and hone their skills before sitting an actual aptitude test.

- used by Career Education Teachers for individuals or in a class setting to provide general guidance to students on what they may expect during the interview process if they intend commencing a career as an apprentice.

- used by Mathematics Teachers as a guide to Industry mathematics requirements at the entry point of a particular apprenticeship career path.

This practice aptitude assessment has three components; Literacy, General Knowledge and Mathematics.

You may find that this assessment differs from similar tests administered by Industry as their tests may have other elements included, that this one does not, such as:

- Mechanical Reasoning;
- Automotive Theory;
- Automotive Knowledge and reasoning;

The mathematics questions contained within this document are equivalent to Applied Mathematics at the Year 10 level in South Australia.

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

Calculators may be used to complete this practice assessment, however Industry in some cases does not allow calculators to be used in their aptitude tests.

# ENGLISH

## Spelling

1. Put the following components into alphabetical order:

Timing cover	Sump
Cam shaft	Piston
Rocker cover	Alternator
Valve	Bonnet
Cam gear	Cam timing belt

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2. Write the plural of the following words:

Mechanic	Child
Woman	Sheep
Branch	

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3. The following sentence has a word missing; you are given 4 spellings of the missing word. Choose the correct word and insert into the sentence.

He arrived at the embassy in a large white...

(a) Limosine, (b) Limosene, (c) Limousine, (d) Limousene

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4. The following text has 10 spelling errors in it. Correct those errors and list them in the order you find them in the text.

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5. The following text has 5 spelling errors in it. Correct those errors and list them in the order you find them in the text.

Maintenance schedules for cars are very important. Lubrication and the replacement of worn spark plugs need regular attention.

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## Comprehension

This is a test of how you understand what you read. Read the following passages below and then answer the questions which follow.

### Motoring History

”Even in recent times, I’ve been called a conman and worse!” protests Ralph Sarich in a new biography of the most controversial man on the Australian Motoring scene.

”Who have I conned? BHP, Ford and the banks who have invested in us? If so, how do they continue to do business with us?”

The fight for credibility is only part of the story told in “Sarich the Man and his Engines” by Pedr Davis. There is also the extraordinary financial history of the Orbital Engine Co, two decades of engine development, the remarkable early life of the inventor and plans for the future.

Two years ago, Modern MOTOR commissioned Pedr Davis, an experienced engineer, to visit Sarich and evaluate the Orbital Combustion Process engine. Not surprisingly, he pursued the theme until he had enough material for his book. The new book reveals a wealth of information on the enigmatic West Australian.

It all seems to be there – the hope and hype generated by the rotary type “Orbital Engine” Sarich developed during the 1970’s the battles between Sarich and race engine guru Phil Irving and the emergence of the new and different OCP two cycle engine in the early 1980’s.

The most interesting part to these eyes is the full technical appendix describing the original Orbital engine and the later OCP engine in great depth.

Sarich always seems a contradiction – on one hand a vast amasser of funds and a man who seems to have no hesitation delivering deadlines and ultimatums to Prime Ministers and corporate presidents.

On the other hand, he is a donator of millions to medical foundations and a man who once could have walked away from his engine company with nearly half a billion dollars but steadfastly refused to sell a single share or cut back his 70 – 100 hour working week. This book only heightens the contradiction of Sarich – engine man, property developer, karate exponent, and inventor of things as varied as an automotive garden system and a self tipping trailer.

### QUESTIONS:

6. Who is the author of the book title, “Sarich – the Man and his Engine”?  
a) Modern Motor, b) Bory Lake, c) Pedr Davis, d) Ralph Sarich \_\_\_\_\_
7. The “Orbital Engine” was developed in:  
a) 1980’s, b) 1970’s, c) 1972, d) 1985 \_\_\_\_\_
8. Sarich was...  
a) An engine man, b) Karate exponent, c) Inventor, d) All of the above \_\_\_\_\_

## Comprehension (cont.)

This is a test of how you understand what you read. Read the following passage below and then answer the questions which follow.

### **Automotive Mechanic (Light Vehicle)**

The job of the Automotive Mechanic (Light Vehicle) has certainly changed in the last decade with the introduction of computer technology. The automotive industry has become more sophisticated and high-tech, and so too have the skills of the Automotive Mechanic.

What sort of training do you need?

To become an Automotive Mechanic (Light Vehicle) usually requires the completion of a New Apprenticeship in Automotive (Mechanical – Light Vehicle). Employers usually require Year 11 with good results in English, maths and science.

The lengths of the training can vary and may involve both on-the-job and off-the-job components. The off-the-job training is provided through Registered Training Organisations to Certificate III level.

You may be able to start training for this occupation while still at school.

Automotive Mechanics (Light Vehicle) may progress to positions such as service manager, workshop foreman, service advisor, technical sales representative, technical officer or diagnostic specialist.

What sort of things do Automotive Mechanics (Light Vehicle) do?

Discuss problems with car drivers or vehicle operators to discover faults, listen to engines, fit and operate special test and diagnostic equipment and test drive vehicles

Repair or replace worn and faulty parts by removing and dismantling assemblies

Reassemble, test, clean and adjust repaired or replaced parts or assemblies, use various tools and equipment to make sure they are working properly and put them back into the vehicle

Diagnose, repair and replace engine management/fuel injection components

Inspect vehicles and issues roadworthiness certificates or list the work required before a certificate can be issued

You may enjoy being an Automotive Mechanic if you...

Are interested in practical and manual work

Are able to work with hand tools

Have a technical aptitude

Have problem-solving skills

Are physically fit

Have a driver's licence

QUESTIONS:

9. To become an Automotive Mechanic, I need to complete:

- (a) a Bachelor in Automotive,
- (b) a Diploma in Automotive
- (c) an Apprenticeship in Automotive,
- (d) a Masters in Automotive

\_\_\_\_\_

10. Employers usually require you to have completed:

- (a) year 10,
- (b) year 11,
- (c) year 12,
- (d) year 13

\_\_\_\_\_

11. The job of an Automotive Mechanic (Light Vehicle) is:

- (a) dirty,
- (b) noisy,
- (c) high-tech,
- (d) smelly

\_\_\_\_\_

12. Which of these skills do you believe an Automotive Mechanic needs:

- (a) Listening,
- (b) Communication
- (c) Listening and Communication,
- (d) Writing

\_\_\_\_\_

13. Automotive Mechanics:

- (a) Make inspections of light vehicles,
- (b) Issues roadworthiness certificates
- (c) Repairs engine components,
- (d) All of the above

\_\_\_\_\_

## GENERAL KNOWLEDGE

1. The figure is a picture of a four cylinder, four stroke, overhead camshaft engine assembly. Which number represents the:
- a. sump
  - b. alternator
  - c. piston
  - d. rocker cover
  - e. valve
  - f. cylinder bore

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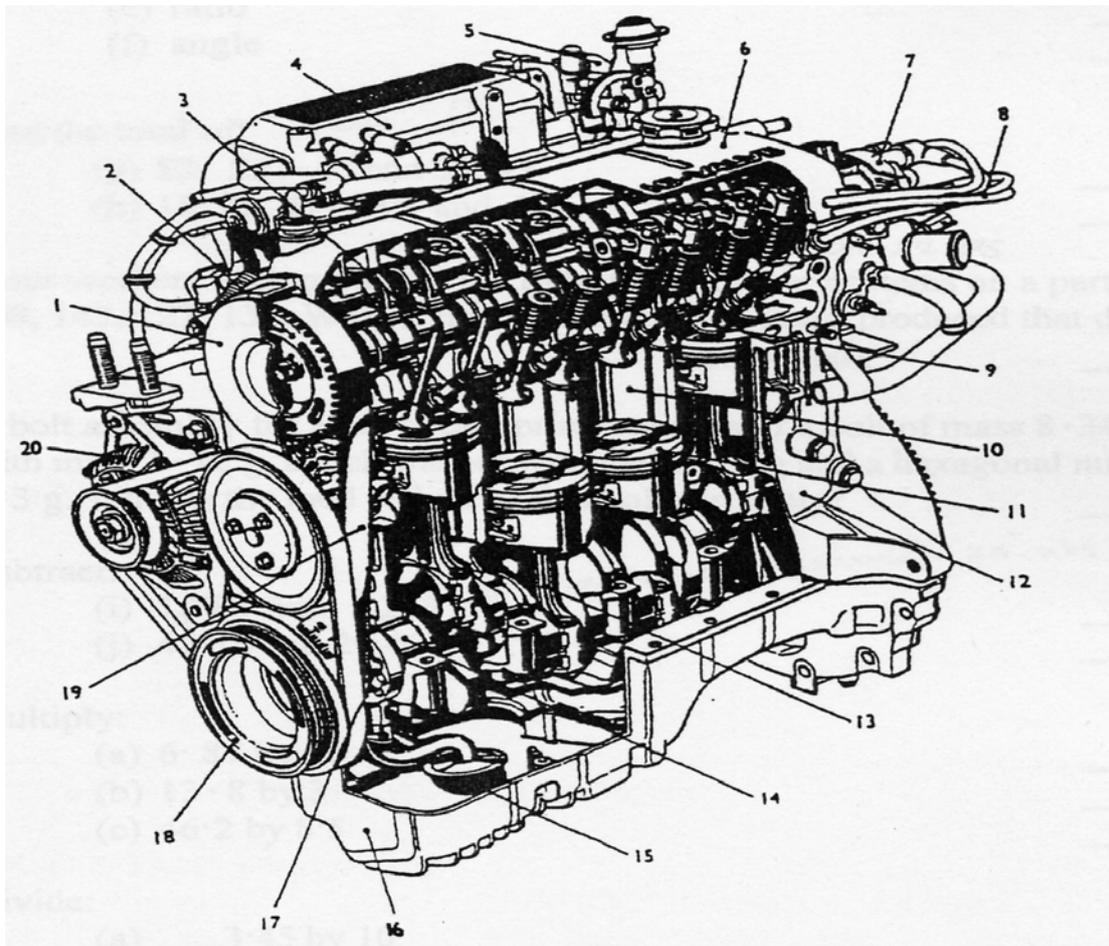
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# MATHEMATICS

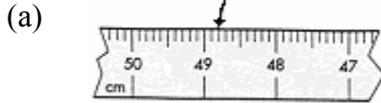
## Numbers (Measurement, Scales, Decimals, Rounding, Estimates, Scientific Notation)

1. Which unit from the list below would you use to measure:

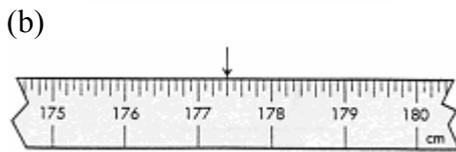
- (a) length \_\_\_\_ (b) time \_\_\_\_ (c) temperature \_\_\_\_ (d) weight \_\_\_\_  
 (e) area \_\_\_\_ (f) speed \_\_\_\_ (g) volume \_\_\_\_ (h) cost \_\_\_\_

kg	ml	km/hr	m <sup>2</sup>
\$	m	min	C

2. What are the following tape readings:



\_\_\_\_\_



\_\_\_\_\_

3. From the list of numbers below, select the one which represents a:

- (a) percentage \_\_\_\_ (b) decimal number \_\_\_\_ (c) fraction \_\_\_\_  
 (d) mixed number \_\_\_\_ (e) ratio \_\_\_\_ (f) angle \_\_\_\_

$\frac{3}{8}$	35	25%
5:4	16.37	$2\frac{3}{4}$

4. Convert the following:

- (a) 8 kilometres to metres  
 (b) 3.5 kilograms to grams

\_\_\_\_\_

\_\_\_\_\_

5. Write the following decimal numbers, from largest to smallest:

7.19	71.9	0.719
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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6. Find the decimal number halfway between:

- (a) 0.6 and 0.8  
 (b) 2.8 and 2.9

\_\_\_\_\_

\_\_\_\_\_

7. Find the value of the following:

- (a)  $2^3$   
 (b)  $\sqrt{36}$

\_\_\_\_\_

\_\_\_\_\_

8. Round

- (a) 35.6754 to two decimal places  
 (b) 425.8 to the nearest tens

\_\_\_\_\_

\_\_\_\_\_

9. Select the best estimate for:

(a)  $4249 \times 71$

280,000	150,000	28,000
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\_\_\_\_\_

(b)  $80,000 \div 38$

200	2,000	20,000	4,000
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\_\_\_\_\_

10. Which one of the following represents the number 27 000 000 000 in scientific notation:

- (a)  $27 \times 10^{10}$ , (b)  $2.7 \times 10^{10}$   
(c)  $2.7 \times 10^{-10}$ , (d)  $.27 \times 10^{10}$

\_\_\_\_\_

11. Multiply the following:

- (a)  $3.485 \times 10^{-2}$   
(b)  $16.919 \times 10^2$

\_\_\_\_\_

\_\_\_\_\_

**Addition, Subtraction, Multiplication, Division**

12. Find the total of:

- (a) \$2, \$21.45 and \$8.23  
(b) 18.32, 471.019 and 315

\_\_\_\_\_

\_\_\_\_\_

13. Find the answer:

- (a)  $5,218 - 1784$   
(b)  $43.18 - 29.461$

\_\_\_\_\_

\_\_\_\_\_

14. Multiply:

- (a) 6.87 by 10  
(b) 13.8 by 3  
(c) 46.2 by 8

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

15. Divide:

- (a) 3.45 by 10  
(b) 3024 by 4  
(c) 56.2 by 0.2

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

16. Select the correct answer to  $18.642 \div 0.02$ :

- (a) 9.321, (b) 93.21, (c) 9321 (d) 932.1

\_\_\_\_\_

**Fractions**

17. Which fraction is between  $\frac{1}{4}$  and  $\frac{3}{4}$ ?

\_\_\_\_\_

18. Add the following:

- (a)  $\frac{1}{4}$  and  $\frac{1}{2}$   
(b)  $\frac{2}{3}$  and  $\frac{5}{6}$   
(c)  $3\frac{1}{4}$  and  $\frac{1}{8}$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

19. Calculate:

- (a)  $\frac{5}{6} - \frac{1}{4}$
- (b)  $2\frac{1}{14} - \frac{4}{7}$

\_\_\_\_\_

\_\_\_\_\_

20. Express as a fraction in lowest terms:

- (a) 0.75
- (b) 2.6
- (c) 30%

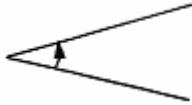
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Geometry

21. Estimate the size of the following angles by selecting the appropriate answers from the list below.



- (a) 30
- (b) 80
- (c) 120

\_\_\_\_\_

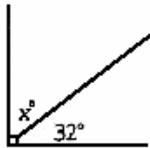


- (d) 30
- (e) 80
- (f) 120

\_\_\_\_\_

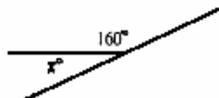
22. Find the value of  $x^\circ$  in the following diagrams:

(a)



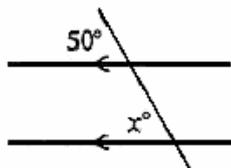
\_\_\_\_\_

(b)



\_\_\_\_\_

(c)

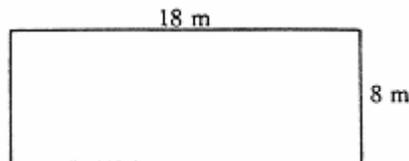


\_\_\_\_\_

### MENSURATION

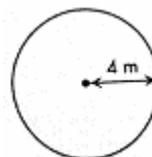
#### Perimeter

23. Find the perimeter of this rectangle.



\_\_\_\_\_

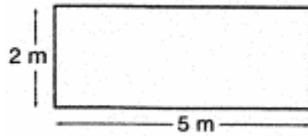
24. Find the circumference of this circle to one decimal place? (Use  $\pi = 3.14$ )



\_\_\_\_\_

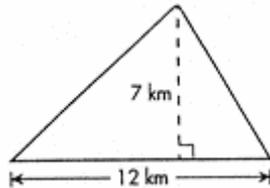
**Area**

25. What is the area of the rectangle?



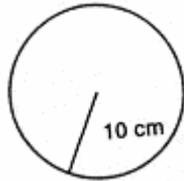
\_\_\_\_\_

26. Find the area of the triangle.



\_\_\_\_\_

27. Find the area of this circle to one decimal place.  
(Use  $\pi = 3.14$ )

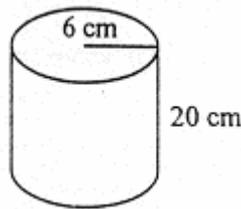


\_\_\_\_\_

**Volume**

28. An oil can in the shape of a cylinder has a radius of 6 cm and a height of 20 cm. What is the volume of the can?

\_\_\_\_\_



**Percentages**

29. Evaluate the following:

- (a) 10% of \$44
- (b) 25% of 12.84

\_\_\_\_\_  
\_\_\_\_\_

30. Barry scored 80% in his automotive exam. There were 25 questions.

- (a) How many questions did Barry get right?
- (b) How many questions did Barry get wrong?

\_\_\_\_\_  
\_\_\_\_\_

31. Michelle, a spare parts interpreter for GTA Automotive, earns \$500 a week. She gets a pay rise of 5%. What is her new weekly wage?

\_\_\_\_\_

32. A car costs \$12000. The price was reduced by 10%. Find:

- (a) the amount the car was reduced by?
- (b) the new cost of the car?

\_\_\_\_\_  
\_\_\_\_\_

33. The price of a tyre is \$120 each. Jamie gets 10% discount for paying cash. How much did Jamie pay for four tyres with the discount?

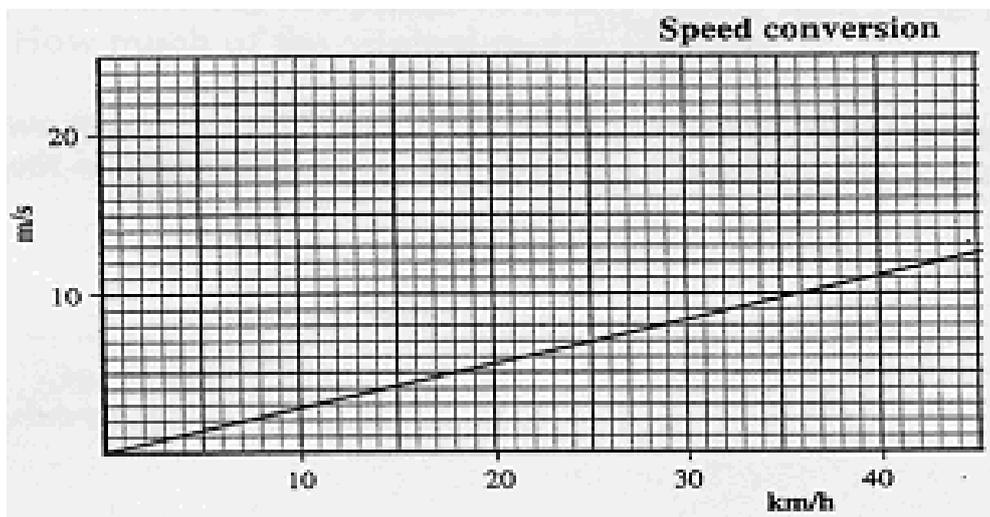
\_\_\_\_\_

**PROBLEM SOLVING**

34. Four workers each produced the following number of oil filters on a particular day: 108, 143, 127, 134. What is the total number of oil filters produced that day? \_\_\_\_\_
35. A bolt assembly for a car's rear spring consists of a bolt of mass  $8.34$  g, a washer with mass  $1.72$  g, a lock washer with mass  $0.8$  g and a hexagonal nut with mass  $2.3$  g. What is the total weight of this bolt assembly? \_\_\_\_\_
36. What is the average of 12 and 18? \_\_\_\_\_
37. The weight of three bolts are 52g, 49g, and 61g. What is the average weight of the bolts? \_\_\_\_\_
38. Two numbers add up to 40. Find the other number if one is 15? \_\_\_\_\_
39. After work, you and four other people share a meal and split the costs evenly at the end. If the bill totaled \$168, how much did each person have to pay? \_\_\_\_\_
40. Peter the mechanic is paid \$10.00 per hour plus time and a half for any hours over 35 hours. If he worked 42 hours, what was his pay for?  
 (a) the first 35 hours of work only \_\_\_\_\_  
 (b) the overtime pay only \_\_\_\_\_  
 (c) the total pay \_\_\_\_\_
41. Daniel is a mechanic and he uses feeler gauges to check the size of small gaps. He has six different size feeler gauges:  $0.015$ mm,  $0.02$ mm,  $0.04$ mm,  $0.08$ mm,  $0.12$ mm and  $0.15$ mm. What combination of gauges would he use to check a size of:  
 (a)  $0.2$ mm \_\_\_\_\_  
 (b)  $0.095$ mm? \_\_\_\_\_

**Graphs**

42. Use the conversion graph below to change:  
 (a) 30 km/h to m/s (to the nearest whole number) \_\_\_\_\_  
 (b) 10 m/s to km/h (to the nearest whole number) \_\_\_\_\_



### Formulae

43. Robert drove 300 km in 6 hours. Calculate his average speed given that **speed = distance divided by time**. \_\_\_\_\_
44. If  $P=F/A$  find P if  $F=60$  and  $A=20$ . \_\_\_\_\_
45. If  $P=F/A$ , make F the subject of the formula. \_\_\_\_\_

### Ratio

46. A 5 litre V8 vehicle uses unleaded petrol in the ratio of 3:1 when compared with a 4 cylinder 1.2 litre vehicle. If there was 24 litres of unleaded petrol in a drum to be shared between the two vehicles, how much would you pump out for the V8 vehicle to use? \_\_\_\_\_
47. The length of a trucks tray top A = 5m. The length of a utilities tray B = 2m. What is the ratio of the trucks tray top to that of the utilities, in simplest terms? \_\_\_\_\_



48. An angle grinder cuts through 0.5cm of steel in 1 minute. How long will it take to make a cut 3.5cm deep? \_\_\_\_\_
49. A car travels at a constant speed. If the car takes 30 minutes to travel 50 kilometres, how many kilometres will it travel in 1 hour? \_\_\_\_\_
50. A car uses 12 litres of petrol per 100 kilometres. If the tank holds 60 litres, how far will it travel on a full tank? \_\_\_\_\_
51. The capacity (volume) of a 6 cylinder car is 2.4 litres. What is the volume of each cylinder? \_\_\_\_\_
52. A cars engine crankshaft revolves 2400 times each minute. How many seconds does it take to revolve 1200 times? \_\_\_\_\_
53. Tom's car uses 10 litres of petrol every 300 kilometres. What is the rate of petrol consumption in km per litre for Tom's car? \_\_\_\_\_
54. An air conditioning unit circulates 320 cubic metres of air per minute. How many cubic metres of air is circulated in a hour? \_\_\_\_\_
55. A mechanic cut two pieces of rubber tubing each 14cm long from a tube 50cm long. How much of the original rubber was left? \_\_\_\_\_
56. Two wheels have 12 and 15 teeth respectively. What is the ratio of the number of teeth on the first wheel to the number of teeth on the second wheel in lowest terms? \_\_\_\_\_

## ANSWERS

### ENGLISH

1. Alternator, Bonnet, Cam gear, Cam shaft, Cam timing belt, Piston, Rocker cover, Sump, Timing cover, Valve
2. a. Mechanics b. women c. branches d. children e. sheep
3. c. Limousine
4. files, solely, individual, whom, recipient, recipient, dissemination, communication, prohibited, unlawful
5. maintenance, schedules, replacement, worn, attention.
6. c) 7. b) 8. d)
9. (c) 10. (b) 11. (c) 12. (c) 13. (d)

### GENERAL KNOWLEDGE

1. (a) 16, (b) 20, (c) 11, (d) 6, (e) 9, (f) 10

### MATHEMATICS

1. (a) m, (b) min, (c) C, (d) kg, (e) m<sup>2</sup>, (f) km/hr, (g) ml, (h) \$
2. (a) 48.8cm, (b) 177.4cm
3. (a) 25%, (b) 16.37, (c)  $\frac{3}{8}$ , (d)  $2\frac{3}{4}$ , (e) 5:4, (f) 35
4. (a) 8000m, (b) 3500g
5. 71.9, 7.19, 0.719
6. (a) 0.7, (b) 2.85
7. (a) 8, (b) 6
8. (a) 35.68, (b) 430
9. (a) 280.000, (b) 2,000
10. (b)  $2 \cdot 7 \times 10^{10}$
11. (a)  $\cdot 03485$ , (b)  $1691 \cdot 9$
12. (a)  $31 \cdot 68$ , (b)  $804 \cdot 339$
13. (a) 3434, (b) 13.719
14. (a)  $68 \cdot 7$ , (b)  $41 \cdot 4$ , (c)  $369 \cdot 6$
15. (a)  $0 \cdot 345$ , (b) 756, (c) 281
16. (d)  $932 \cdot 1$
17.  $\frac{2}{4}$  or  $\frac{1}{2}$
18. (a)  $\frac{3}{4}$ , (b)  $\frac{9}{6} = 1\frac{1}{2}$ , (c)  $\frac{27}{8} = 3\frac{3}{8}$
19. (a)  $\frac{7}{12}$ , (b)  $2\frac{1}{14} = 1\frac{7}{14} = 1\frac{1}{2}$
20. (a)  $\frac{3}{4}$ , (b)  $2\frac{6}{10} = 2\frac{3}{5}$ , (c)  $\frac{30}{100} = \frac{3}{10}$
21. (a) 30, (b) 120
22. (a) 58, (b) 20, (c) 50
23. 52m
24.  $25 \cdot 12m$
25.  $10m^2$
26.  $42km^2$
27.  $314cm^2$
28.  $2,260.8cm^3$
29. (a) \$4.40, (b) 3.21
30. (a) 20, (b) 5
31. \$525
32. (a) \$1,200, (b) \$10,800
33. \$432
34. 512
35. 13.16g
36. 15
37. 54g
38. 25
39. \$33.60
40. (a) \$350, (b) 105, (c) 455
41. (a) 0.08mm and 0.12mm, (b) 0.08mm and 0.015mm
42. (a) 8m/s, (b) 36km/h
43. 50km/h
44. 3
45.  $F = \frac{P}{A}$
46. 18 litres
47. 2.5:1
48. 7 minutes
49. 100km
50. 500km
51.  $\cdot 4litres$
52. 30 seconds
53. 30km/l
54.  $19200m^3$
55. 22cm
56. 4:5