**GCSE Mathematics**

**Practice Tests: Set 18**

**Paper 2H/3H (Calculator)**

**Time: 1 hour 30 minutes**

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

**Instructions**

* Use **black** ink or ball-point pen.
* **Fill in the boxes** at the top of this page with your name,
centre number and candidate number.
* Answer **all** questions.
* Answer the questions in the spaces provided

– *there may be more space than you need*.

* **Calculators may not be used.**
* Diagrams are NOT accurately drawn, unless otherwise indicated.
* You must **show all your working out.**

**Information**

* The total mark for this paper is 80
* Questions are in order of mean difficulty as found by students achieving Grade 7.
* The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question*.

**Advice**

* Read each question carefully before you start to answer it.
* Keep an eye on the time.
* Try to answer every question.
* Check your answers if you have time at the end.

**Answer ALL EIGHTEEN questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** A solid aluminium cylinder has radius 10 cm and height *h* cm.

The mass of the cylinder is 5.4 kg.

The density of aluminium is 0.0027 kg/cm3

Calculate the value of *h*.

Give your answer correct to one decimal place.

*h* = ......................................................

(**Total for Question 1 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**2** Victor buys 12 bottles of apple juice for a total cost of $21

Victor sells all 12 bottles at $2.45 each bottle.

Work out Victor’s percentage profit.

.......................................................%

**(Total for Question 2 is 3 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**3** Ali and Badia each have 25 000 dollars to invest.

|  |  |
| --- | --- |
| **Cyclone Bank** | **Tornado Bank** |
| Invest 25 000 dollars4.5% compound interest per yearfor 3 years | Invest 25 000 dollarsReceive 1150 dollars interest each yearfor 3 years |

Ali invests in the Cyclone Bank for 3 years.

Badia invests in the Tornado Bank for 3 years.

By the end of the 3 years, Ali will have received more interest than Badia.

How much more?

Show your working clearly.

Give your answer correct to the nearest dollar.

....................................................... dollars

**(Total for Question 3 is 4 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**4** The table gives information about the amounts of money, in euros, that 70 of Anjali’s

friends spent last Saturday.

|  |  |
| --- | --- |
| **Money spent (*S* euros)** | **Frequency** |
| 0 < *S* ≤ 8 | 6 |
|  8 < *S* ≤ 16 | 14 |
| 16 < *S* ≤ 24 | 19 |
| 24 < *S* ≤ 32 | 25 |
| 32 < *S* ≤ 40 | 6 |

One of Anjali’s 70 friends is going to be chosen at random.

(*a*)Find the probability that this friend spent more than 24 euros last Saturday.

.......................................................

(**1)**

(*b*)Work out an estimate for the mean amount of money spent by Anjali’s friends last Saturday.

Give your answer correct to 2 decimal places.

....................................................... euros

**(4)**

**(Total for Question 4 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**5** Write 3.6 × 103 as a product of powers of its prime factors.

Show your working clearly.

......................................................

(**Total for Question 5 is 3 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**6** The diagram shows a regular octagon *ABCDHIJK* and a pentagon *DEFGH*.

Angle *GHD* = angle *FGH*.

Work out the size of the angle marked *x*.

Show your working clearly.

.......................................................°

**(Total for Question 6 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**7** Here are two rectangles, rectangle *A* and rectangle *B*.

The area of rectangle *B* is twice the area of rectangle *A*.

Work out the value of *x*.

Show your working clearly.

*x* = .......................................................

(**Total for Question 7 is 4 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**8** In 2018, the population of Sydney was 5.48 million.

This was 22% of the total population of Australia.

Work out the total population of Australia in 2018

Give your answer correct to 3 significant figures.

...................................................... million

**(Total for Question 8 is 3 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**9** A box contains 15 counters.

There are 4 red counters, 5 green counters and the rest are yellow counters.

Niklas takes at random a counter from the box and writes down the colour of his counter.

He then puts the counter back into the box.

Sasha then takes at random a counter from the box and writes down the colour of her counter.

Work out the probability that the counters taken by Niklas and Sasha both have the same colour.

.......................................................

(**Total for Question 9 is 3 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**10** There are 54 fish in a tank.

Some of the fish are white and the rest of the fish are red.

Jeevan takes at random a fish from the tank.

The probability that he takes a white fish is 

(*a*)Work out the number of white fish originally in the tank.

…....................................................

(**2)**

Jeevan puts the fish he took out, back into the tank.

He puts some more white fish into the tank.

Jeevan takes at random a fish from the tank.

The probability that he takes a white fish is now 

(*b*)Work out the number of white fish Jeevan put into the tank.

.......................................................

(**2)**

**(Total for Question 10 is 4 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**11** Here is a quadrilateral *ABCD*.

Calculate the area of quadrilateral *ABCD*.

Give your answer correct to 3 significant figures.

Show your working clearly.

....................................................... cm2

**(Total for Question 11 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**12** The diagram shows the front of a wooden door with a semicircular glass window.

Julie wants to apply 2 coats of wood varnish to the front of the door, shown shaded in

the diagram.

250 millilitres of wood varnish covers 4 m2 of the wood.

Work out how many millilitres of wood varnish Julie will need.

Give your answer correct to the nearest millilitre.

...................................................... millilitres

**(Total for Question 12 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**13** Alison buys 5 apples and 3 pears for a total cost of £1.96

Greg buys 3 apples and 2 pears for a total cost of £1.22

Michael buys 10 apples and 10 pears.

Work out how much Michael pays for his 10 apples and 10 pears.

Show your working clearly.

£......................................................

(**Total for Question 13 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**14** Manuel collected information about the flights that arrived late at an airport last month.

The table gives information about the number of minutes that these flights were late.

|  |  |
| --- | --- |
| **Minutes late (*L* minutes)** | **Frequency** |
| 0 < *L* ≤ 10 | 8 |
| 10 < *L* ≤ 15 | 13 |
| 15 < *L* ≤ 25 | 19 |
| 25 < *L* ≤ 40 | 24 |
| 40 < *L* ≤ 60 | 6 |

(*a*)On the grid, draw a histogram for this information.

**(3)**

Manuel selected at random a flight that was late by 25 minutes or less from his results.

(*b*)Work out an estimate for the probability that this flight was late by 5 minutes or less.

.......................................................

(**2)**

**(Total for Question 14 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**15** A rainwater tank contains 2.4 × 107 raindrops.

The rainwater tank also contains 1.75 × 106 bacteria.

(*a*)Work out the number of bacteria per raindrop in the tank.

Give your answer in standard form correct to 2 significant figures.

..............................................

(**3)**

A drop of rainwater contains 5.01 × 1021 atoms.

In a drop of rainwater the number of atoms is 3 times the number of molecules.

(*b*)Work out the number of molecules in the rainwater tank.

Give your answer in standard form correct to one significant figure.

....................................................... molecules

**(2)**

**(Total for Question 15 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**16** Yasmin has some identical rectangular tiles.

Each tile is *L* cm by *W* cm.

Using 9 of her tiles, Yasmin makes rectangle *ABCD*, shown in the diagram below.

The area of *ABCD* is 1620 cm2

Work out the value of *L* and the value of *W*.

*L* = ............................. *W* = .............................

(**Total for Question 16 is 5 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**17** The diagram shows a sphere of diameter *x* cm and a pyramid *ABCDE* with a horizontal

rectangular base *BCDE*.

The vertex *A* of the pyramid is vertically above the centre *O* of the base so that

*AB* = *AC* = *AD* = *AE*.

*BC* = *x* cm, *CD* = 2*x* cm and *AO* = 5*x* cm.

The volume of the sphere is 288*π* cm3

Calculate the total surface area of the pyramid.

Give your answer correct to the nearest cm2

....................................................... cm2

**(Total for Question 17 is 6 marks)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**18** Here are the first four terms of an arithmetic series.



Given that the 15th term of the series is (90 + 2*k*),

calculate the sum of the first 30 terms of the series.

.......................................................

(**Total for Question 18 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**