E Maths Test

/75 marks

1. A train leaves Zurich at 22 40 and arrives in Vienna at 07 32 the next day.

   Work out the time the train takes.

..... h ..... min [1]

2. In a box of 80 glasses, 3 are broken.
   Work out the percentage of broken glasses in the box.

..... % [1]

3. Here is a list of numbers.
   Put a ring around the number with the largest value.

0.3030 $\frac{1}{3}$ 0.0330 $\frac{3}{10}$ 33%

[1]

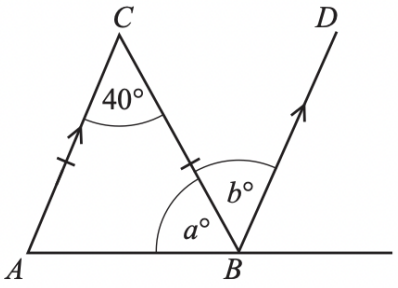
4. Chai says that 8 cm^2 is the same as 80 mm^2.
   Explain why Chai is wrong.

.....
[1]

5. $y = mx + c$.
   Find the value of y when $m = -2$, $x = -7$ and $c = -3$.

y = ... [2]

6.



NOT TO SCALE

Triangle *ABC* is isosceles.

AC is parallel to *BD*.

Find the value of *a* and the value of *b*

a = ...

b = ... [2]

7. Rearrange the formula $5w - 3y + 7 = 0$ to make *w* the subject.

w = ... [2]

8. Explain why $\sqrt{3}$ is irrational.

.....

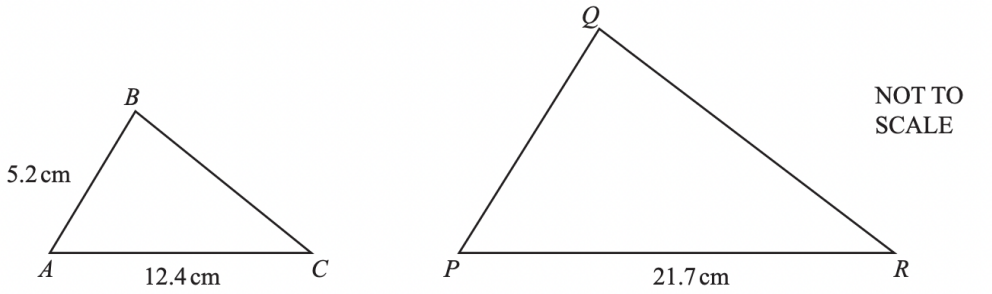
[1]

9. The mass, m kilograms, of a horse is 429 kg, correct to the nearest kilogram.

   Complete this statement about the value of m.

..... ⩽ m < ..... [2]

10. Triangle ABC is similar to triangle PQR.



Find PQ.

PQ = ... cm [2]

11. Solve the inequality $n + 7 < 5n - 8$.

..... [2]

12. **Without using your calculator**, work out $1\frac{7}{12} + \frac{13}{20}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

13. Here is a sequence of numbers.

7, 5, 3, 1, – 1, ...

a. Find the next term in this sequence.

..... [1]

b. Find an expression for the *n*th term of this sequence.

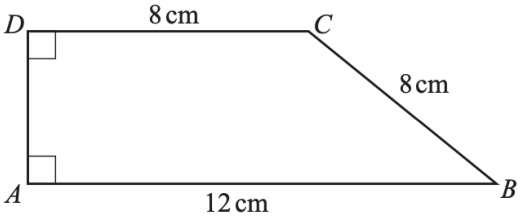
..... [2]

14. A hexagon has five angles that each measure 115°.

Calculate the size of the sixth angle.

..... [3]

15. Calculate the area of this trapezium.

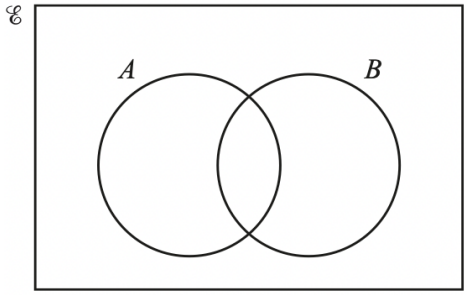


NOT TO SCALE

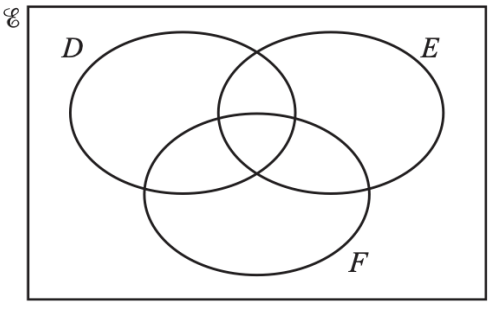
.....cm^2 [4]

16. Shade the region in each of the Venn diagrams below.

a.



b. $A' \cup B$



[4]

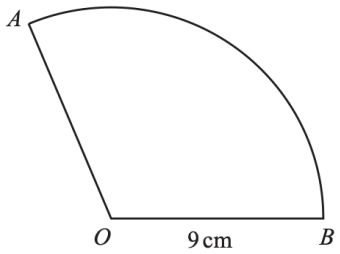
$(D \cap E)' \cap F$.

17. *AB* is an arc of a circle, centre *O*, radius 9 cm.

The length of the arc *AB* is 6π cm.

The area of sector *AOB* is *k*π cm2.

Find the value of *k*.



NOT TO SCALE

k = ... [3]

18.

a. Simplify $(27x^6)^{\frac{1}{3}}$.

..... [2]

b. Find the value of $(64x^4)^{0.5} \times 4x^{-2}$.

..... [3]

19. Solve the simultaneous equations. You must show all your working.

$y = 5x^2 + 4x - 19$

$y = 4x + 1$

x = ... y = ...

x = ...y = ... [5]

20. (a) Kristian and Stephanie share some money in the ratio 3 : 2. Kristian receives $72.

(i) Work out how much Stephanie receives.

$..... [2]

(ii) Kristian spends 45% of his $72 on a computer game. Calculate the price of the computer game.

$..... [1]

(iii) Kristian also buys a meal for $8.40 . Calculate the fraction of the $72 Kristian has left after buying the computer game and the meal.
Give your answer in its lowest terms.

..... [2]

(iv) Stephanie buys a book in a sale for $19.20 . This sale price is after a reduction of 20%.

Calculate the original price of the book.

$..... [3]

(b) Boris invests $550 at a rate of 2% per year simple interest.

Calculate the value of the investment at the end of 10 years.

$..... [3]

(c) Marlene invests $550 at a rate of 1.9% per year compound interest. Calculate the value of the investment at the end of 10 years.

$..... [2]

(d) Hans invests $550 at a rate of x% per year compound interest.
At the end of 10 years, the value of the investment is $638.30, correct to the nearest cent.

Find the value of x.

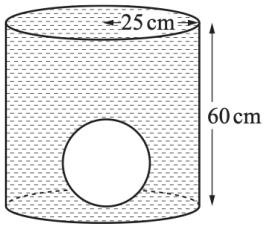
x = ... [3]

21. (a) Show that the volume of a metal sphere of radius 15 cm is 14140 cm^3, correct to 4 significant figures.

[The volume, *V*, of a sphere with radius *r* is $V = \frac{4}{3}\pi r^3$]

[2]

(b) (i)The sphere is placed inside an empty cylindrical tank of radius 25 cm and height 60 cm. The tank is filled with water.

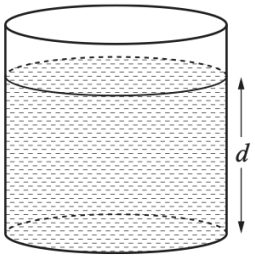


NOT TO SCALE

Calculate the volume of water needed to fill the tank.

.....cm3 [3]

(ii)The sphere is removed from the tank.



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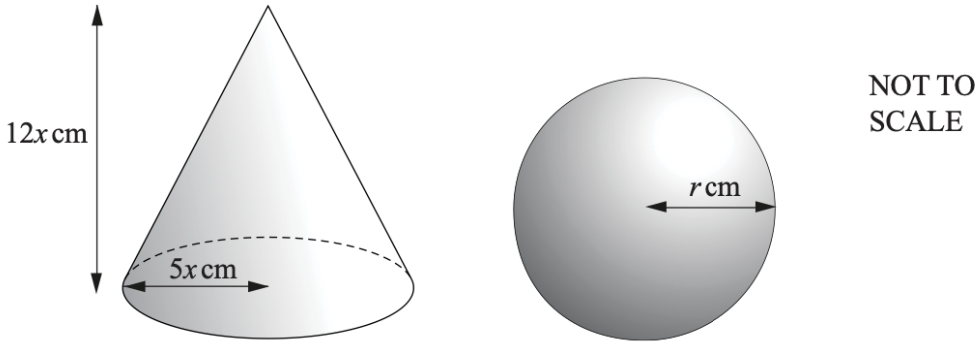
Calculate the depth, *d*, of water in the tank.

d = ... cm [2]

(c) The diagram below shows a solid circular cone and a solid sphere.



The cone has radius $5x$ cm and height $12x$ cm.
The sphere has radius r cm.
The cone has the same **total** surface area as the sphere.

Show that $r^2 = \frac{45}{2}x^2$.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.] [The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

[5]