DULWICH COLLEGE | SINGAPORE |

Year Examination
Mathematics (Accelerated)

Paper 2

May 2017

Name:.....

Time allowed: 1 hour 30 minutes

Total Marks	/76	Teacher comment:
	%	
Level/Grade		

Student reflection

1

A pattern of numbers is shown below.

						1								
					1		1							
				1		2		1						
			1		3		3		1					
		1		4		6		4		1				
	1		5		10		10		5		1			
1		6		x		20		x		6		1		

Write down the value of x.

Answer ..... [1]

2

The population of Olton is decreasing at a rate of 3% per year.
In 2013, the population was 50 000.

Calculate the population after 4 years.
Give your answer correct to the nearest hundred.

Answer ..... **[3]**

3

Solve the equation

$$\frac{3x-2}{5}=8.$$

Answer $x =$ ..... [2]

4

From the list of numbers $\frac{22}{7}$, π, $\sqrt{14}$, $\sqrt{16}$, 27.4, $\frac{65}{13}$ write down

(a) one integer,

Answer(a) ..... [1]

(b) one irrational number.

Answer(b) ..... [1]

5

A train left Sydney at 23 20 on December 18th and arrived in Brisbane at 02 40 on December 19th. How long, in hours and minutes, was the journey?

Answer h min [1]

6

Simplify $\frac{2}{3}p^{12} \times \frac{3}{4}p^{8}$.

Answer [2]

= < >

Choose one of the symbols given above to complete each of the following statements.

When $x = 6$ and $y = -7$, then

(a) x y [1]

(b) x^2 y^2 [1]

(c) $y - x$ $x - y$ [1]

7

Write the numbers 0.5^2, $\sqrt{0.5}$, 0.5^3 in order with the **smallest** first.

Answer < < [2]

8

A square has sides of length d metres.
This length is 120 metres, correct to the nearest 10 metres.

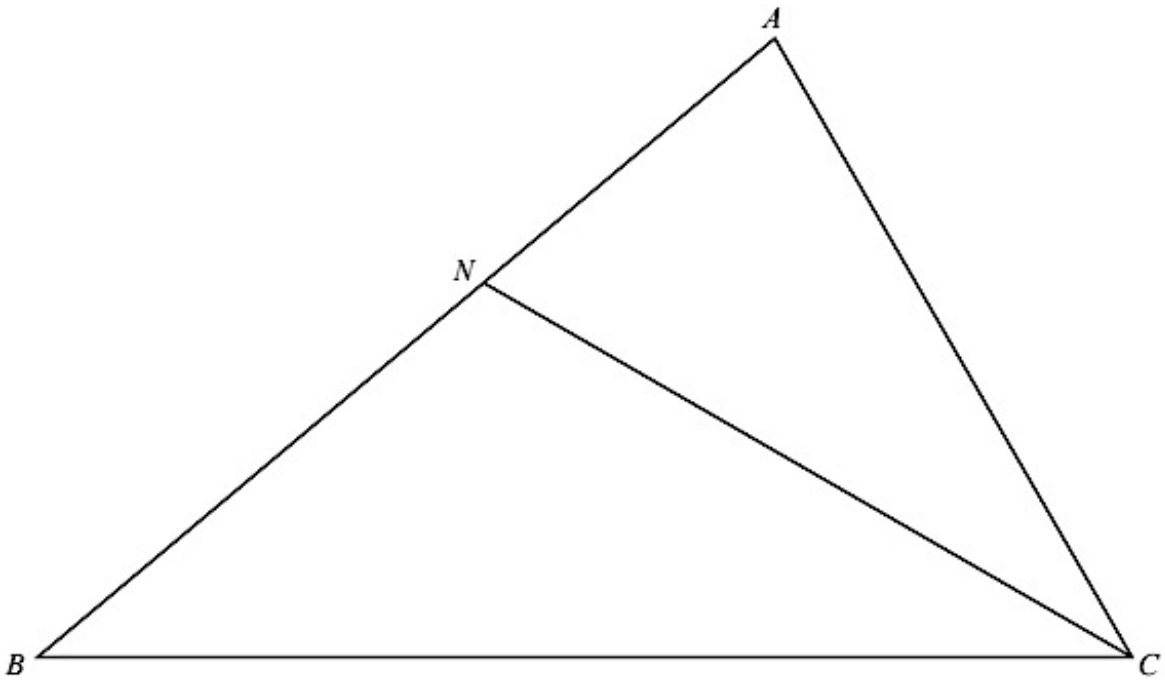
(a) Complete the statement in the answer space.

Answer(a) ..... $\leqslant d <$ ..... [1]

(b) Calculate the difference between the largest and the smallest possible areas of the square.

Answer(b) ..... m^2 [2]

9



In triangle ABC, CN is the bisector of angle ACB.

(a) **Using a ruler and compasses only**, construct the locus of points inside triangle ABC that are 5.7 cm from B. [1]

(b) Shade the region inside triangle ABC that is

- more than 5.7 cm from B

and

- nearer to BC than to AC. [1]

10

Solve the simultaneous equations

$$\frac{1}{2}x + y = 5,$$

$$x - 2y = 6.$$

Answer $x =$ $y =$ [3]

11

Make d the subject of the formula

$$c = kd^2 + e.$$

Answer $d =$ [3]

12

(a) Factorise completely $12x^2 - 3y^2$.

Answer(a) [2]

(b) **(i)** Expand $(x-3)^2$.

Answer(b)(i) [2]

(ii) $x^2 - 6x + 10$ is to be written in the form $(x-p)^2 + q$.
Find the values of p and q.

Answer(b)(ii) $p =$ $q =$ [2]

13

$243^x = 3^2$

Find the value of x.

Answer(b) $x =$ ..... [2]

14

Simplify

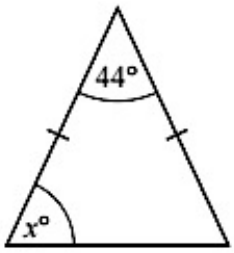
(a) $\left(\frac{x^{27}}{27}\right)^{\frac{2}{3}}$,

Answer(a) [2]

(b) $\left(\frac{x^{-2}}{4}\right)^{-\frac{1}{2}}$.

Answer(b) [2]

15 **(a)**



NOT TO SCALE

The diagram shows an isosceles triangle.

Find the value of x.

Answer(a) $x =$ ..... **[1]**

(b) The exterior angle of a regular polygon is 24°.

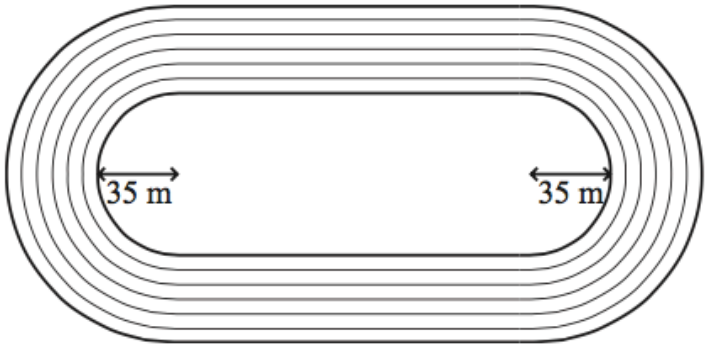
Find the number of sides of this regular polygon.

Answer(b) ..... **[2]**

16 $0.2\dot{5} = \frac{23}{90}$ Show that

Answer ..... [2]

17



NOT TO SCALE

The diagram shows an athletics track with six lanes.
The distance around the inside of the inner lane is 400 metres.
The radius of each semicircular section of the inside of the inner lane is 35 metres.

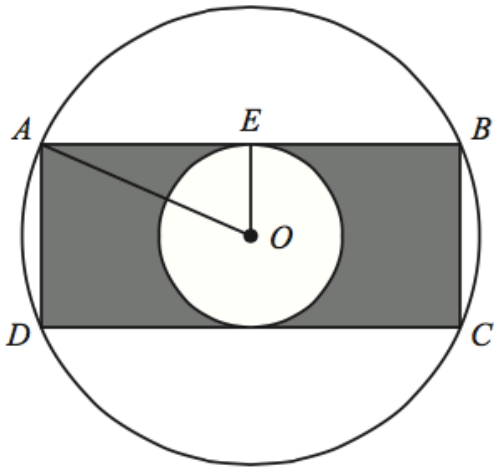
(a) Calculate the total length of the two straight sections at the inside of the inner lane.

Answer(a) ..... m [3]

(b) Each lane is one metre wide.
Calculate the difference in the distances around the outside of the outer lane and the inside of the inner lane.

Answer(b) ..... m [2]

18



NOT TO SCALE

A,*B*,*C* and *D* lie on a circle, centre *O*, radius 8 cm.
AB and *CD* are tangents to a circle, centre *O*, radius 4 cm.
ABCD is a rectangle.

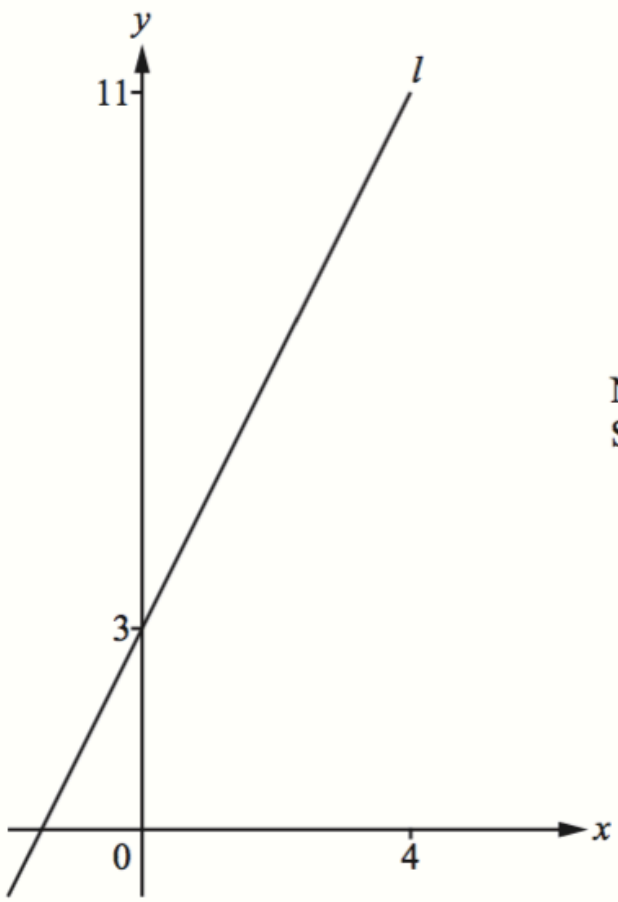
(a) Calculate the distance *AE*.

Answer(a) $AE =$ cm [2]

(b) Calculate the shaded area.

Answer(b) cm^2 [3]

19 (a)



The diagram shows the straight line, l, which passes through the points (0, 3) and (4, 11).

Find the equation of line l in the form $y = mx + c$.

Answer(a) $y =$ ..... [3]

(b)

Find the equation of the line that

- is perpendicular to the line $y = 3x - 1$

and

- passes through the point (7, 4).

Answer ..... [3]

(c)

The point A has co-ordinates $(-4, 6)$ and the point B has co-ordinates $(7, -2)$.

Calculate the length of the line AB.

Answer $AB =$ ..... units [3]

20

Two sequences have 1, 3, 5 as their first three terms.

(a) In the first sequence, each term is 2 more than the term before it.

(i) Find an expression, in terms of n, for the nth term.

Answer ..... [1]

(ii) The kth term of this sequence is 841.

Find the value of k.

Answer $k =$ ..... [1]

(b) The nth term of the second sequence is

$$2^{n-1} - \frac{(n-1)(n-4)}{2}.$$

(i) Find the fourth term of this sequence.

Answer.....(2)

(ii) Find the fifth term of this sequence.

Answer.....(2)

21 Pavan saves $\$x$ each month.
His two brothers **each** save \$4 more than Pavan each month.

Altogether the three boys save \$26 each month.

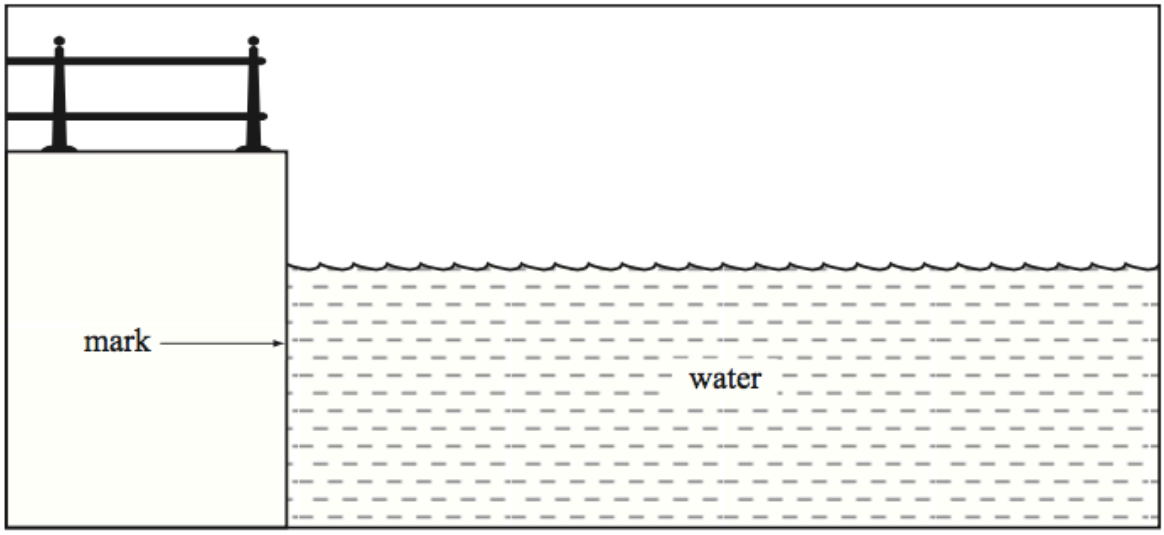
(a) Write down an equation in x.

Answer(a) ..... **[1]**

(b) Solve your equation to find the amount Pavan saves each month.

Answer(b) \$..... **[2]**

22.



The height, h metres, of the water, above a mark on a harbour wall, changes with the tide.
It is given by the equation

$$h = 3\sin(30t)^\circ$$

where t is the time in hours after midday.

(a) Calculate the value of h at midday.

Answer (a) [1]

(b) Calculate the value of h at 1900.

Answer (b) [2]

(c) Explain the meaning of the negative sign in your answer.

Answer (c) [1]

TOTAL: 76 MARKS