Secondary One Express Mathematics

End of Year Examination (Set 2)

Paper 1

50

1. (i) Given that $a : b = 6 : 5$ *and* $b : c = 10 : 3$, find the value of $a : c$.

(ii) The ratio of Angel's age to Benny's age is 6 : 5 and the ratio of Benny's age to Charlie's age is 10 : 3. Given that Angel is 20 years old, find Charlie's age.

Answer (a)..... [2]

(b)..... [1]

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2. (a) Express 630 as a product of its prime factors.
(b) Hence find the smallest integer m, such that $630m$ is a perfect square.
(c) Find the smallest integer k in index notation, such that $(630 + 630^2)k$ is a perfect cube.
Hint: 631 is a prime number.

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

(b)..... [1]

(c)..... [2]

3. Use your calculator to evaluate $\frac{\sqrt{3.56}}{\sqrt[3]{7.56}+1}$ giving your answer correct to 3 significant figures.

Answer …… [2]

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4. Consider the sequence 38, 36, 34, 32, ….
   (a) Find the next two terms
   (b) Write down an expression, in term of n, for the n^{th} term of the sequence.
   (c) Find the 50^{th} term.

Answer (a)…… [1]

(b)…… [1]

(c)…… [1]

5. In a cycling competition, the total distance the participants are required to cycle is 120 km. Samuel cycles at an average speed of 17 km/h.
   (a) Express
      (i) 120 km in m,
      (ii) 15km/h in m/s.
   (b) Calculate the time taken for Samuel to complete the competition, giving your answer in hours and minutes, correct to the nearest minute.

Answer (ai)..... [1]

(aii)..... [1]

(b)..... [2]

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6. Box *A* is 20% larger than box *B* while box *C* is 10% smaller than box *B*. Find the ratio of the size of Box *A* to that of Box *C*.

Answer ..... [2]

7. Given that $h = 8$, evaluate $\frac{\sqrt{2h}+6}{2} - 3 + h$.

Answer …… [2]

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8. Kelvin is y years old and Danny is 5 years younger than Kelvin.
Find an expression, in its simplest form, for the sum of the boys' ages.
(a) at the present time
(b) in three years time

Answer (a)…… [2]

(b)…… [1]

9. (a) Expand and simplify $3k^2 - 1 - 3k(k-1)$.

(b) (i) Factorise $a^2b - ab^2$ completely.

(ii) Hence evaluate $100^2 \times 99 - 100 \times 99^2$, without the use of calculator.

Answer (a)..... [2]

(bi)..... [1]

(bii)..... [2]

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10. Simplify the following algebraic expressions,

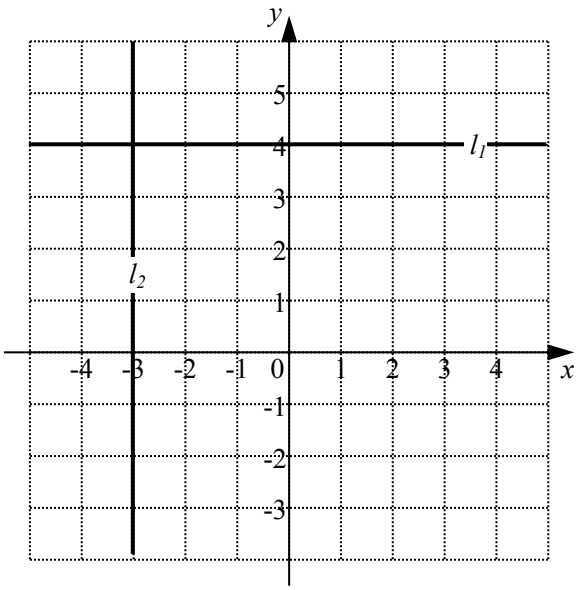
(i) $\frac{2x}{5} - \frac{2x}{3} + \frac{5x}{6}$

(ii) $\frac{5}{9} - \frac{h-5}{3}$

Answer (a)..... [2]

(b)..... [2]

11. Write down the equations of the straight lines l_1 and l_2.



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

(b)..... [1]

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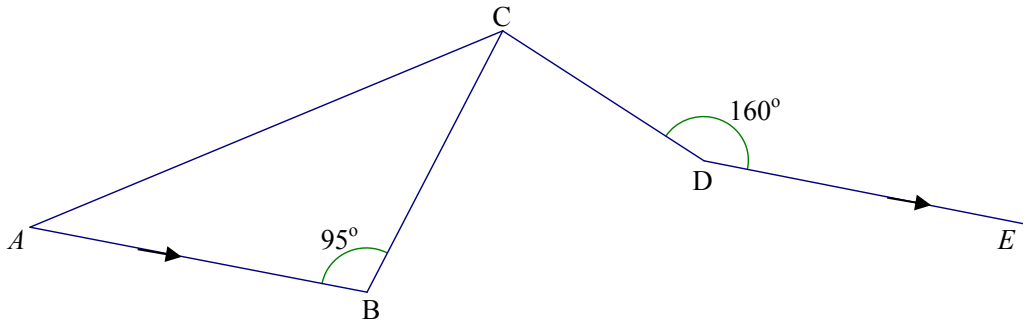
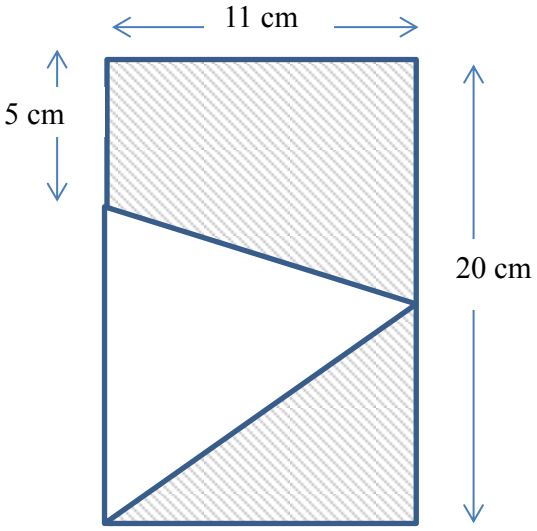
12. In the figure, $\angle ABC = 95°$, $\angle CDE = 160°$ and AB is parallel to DE. Find acute $\angle BCD$.



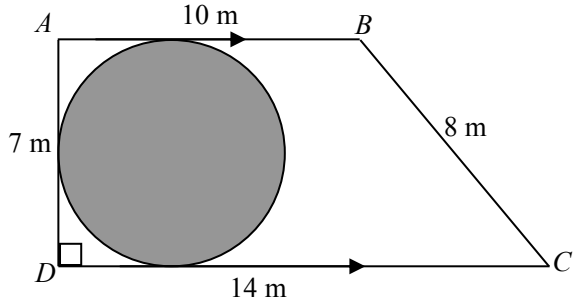
Answer $\angle BCD$ =..... [3]

13. Find the area of the shaded region in the following diagram.



Answer ..... [3]

14.



The diagram above shows a plot of land such that AB is parallel to DC, $AB = 10$ m, $AD = 7$ m, $DC = 14$ m and $BC = 8$ m. The shaded circle is a pond and the unshaded part is planted with grass.

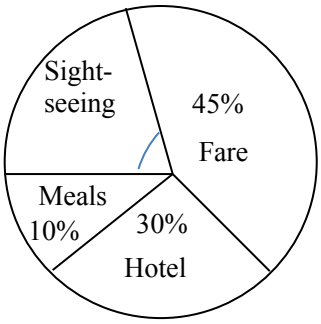
(a) Find the area of the land that is planted with grass.

(b) Given that the cost of grass is \$3.27 per m^2, find the cost of the grass planted on the plot of land.

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

(b)..... [2]

15. The pie chart below shows the expenditure of a tourist when he came to Singapore.
    (a) Calculate the angle of the sector representing 'Sight-seeing'.
    (b) If he spent a total of $2000, how much did he spend on hotel?
    (c) Describe an advantage of using a pie chart rather than a bar graph to represent the information.



Answer (a)..... [2]

(b)..... [2]

(c)..... [1]

Set 2
Mark Scheme Secondary 1 End of Year Examination

Question	Method	Marks
1i	a : b = 12 : 10 b : c = 10 : 3 Therefore a: c = 12 : 3 = 4 : 1	 [**M1**] **[A1]**
1ii	20 ÷ 4 = 5 Charlie is 5 years old.	 **[B1]**
2a	$630 = 2\times3^2\times5\times7$	[B1]
2b	$m = 2\times5\times7 = 350$	[B1]
2c	$\left(630+630^2\right)k = 630\left(1+630\right)k$ $= 630\times631\times k$ $= 2\times3^2\times5^2\times7\times631\times k$ $\therefore k = 2^2\times3\times7^2\times631^2$	[**M1**] **[A1]**
3	$\frac{\sqrt{3.56}}{\sqrt[3]{7.56}+1} = 0.63686$ $= 0.637$ (to 3 s.f.)	[**M1**] **[A1]**
4a	30, 28	**[B1]**
4b	$T_n = 38+\left(n-1\right)\left(2\right)$ $= 2n+36$	**[B1]**
4c	$T_{50} = 2\left(50\right)+36$ $= 136$	 **[B1]**
5a	120 000 m	**[B1]**
5b	4.72 m/s (to 3 sf)	**[B1]**
5b	Time = 120 ÷ 7 = 7.058 h 0.058h × 60 = 3.529 min Therefore, 7.058 h = 7h 4 min (correct to nearest minute)	**[M1]** **[A1]**
6	Let Box A's volume be x cm^3 Box B's volume be $1.2x$ cm^3 Box A's volume be $0.9x$ cm^3	**[M1] (any 1 of Box B or Box C correct)**

	$\frac{\text{Box A}}{\text{Box C}} = \frac{1.2x}{0.9x}$ $= \frac{1.2}{0.9}$ $= \frac{4}{3}$ Hence ratio 4 : 3	**[A1]**
7	When $h = 8$, $\frac{\sqrt{2h}+6}{2} - 3 + h$ $= \frac{\sqrt{2(8)}+6}{2} - 3 + 8$ $= 16$	**[M1] substitution** **[A1]**
8a	Danny is (y - 5) years old. Total age = $y + y - 5 = (2y - 5)$ years	**[M1]** **[A1]**
8b	In three years time, total increase in age = 6 Total age = $(2y-5)+6 = 2y+1$ years.	**[B1]**
9a	$3k^2 - 1 - 3k(k-1) = 3k^2 - 1 - 3k^2 + 3k$ $= 3k - 1$	**[M1]** **[A1]**
9bi	$a^2b - ab^2 = ab(a-b)$	**[B1]**
9bii	Let a = 100, b = 99 $100^2 \times 99 - 100 \times 99^2$ $= (100 \times 99)(100 - 99)$ $= 9900$	**[M1]** **[A1]**
10i	$\frac{2x}{5} - \frac{2x}{3} + \frac{5x}{6} = \frac{12x}{30} - \frac{20x}{30} + \frac{25x}{30}$ $= \frac{17x}{30}$	**[M1]** **[A1]**
10ii	$\frac{5}{9} - \frac{3(h-5)}{9} = \frac{5 - 3h + 15}{9}$ $= \frac{-3h + 20}{9}$	**[M1]** **[A1]**
11a	$y = 4$	**[B1]**
11b	$x = -3$	**[B1]**
12	Draw an auxiliary line CF such that CF // DE. $\angle$ DCF = 180 - 160 (int $\angle$, CF//DE) = 20 °	**[M1]**

	$\angle$ BCF = 95° (alt $\angle$, CF//DE) Therefore, $\angle$ BCD = 95 - 20 = 75°	**[M1]** **[A1]**
13	Area rectangle = $11 \times 20 = 220$ cm^2 Area Triangle = $\frac{1}{2} \times (20 - 5) \times 11 = 82.5$ cm^2 Shaded region = 220 - 82.5 = 137.5 cm^2	**[M1]** **[M1]** **[A1]**
14a	Radius = $7 \div 2 = 3.5$ m Area pond = $\pi (3.5)^2 = 38.5$ m^2 Area Trapezium = $\frac{1}{2} \times (10 + 14)(7) = 84$ m^2 Grass region = $84 - 38.5$ m^2 = 45.5 m^2	**[M1]** **[M1]** **[A1]**
14b	Cost = 45.5×3.27 = 148.785 = 148.79 (nearest cent)	**[M1]** **[A1]**
15a	Percentage sightseeing = 100 – 45 –30 – 10 = 15% Angle sightseeing = $\frac{15}{100} \times 360° = 54°$	**[M1]** **[A1]**
15b	Spent on hotel = $\frac{30}{100} \times \$2000 = \$600$	**[B1]**
15c	A pie chart is able to show the proportion of his expenditure more clearly as compared to a bar graph.	**[B1]**