

CALCULATORS ARE ALLOWED IN THIS PAPER

Answer **all** questions.

1. Evaluate

(a) $4 - 2\left(10 - \frac{3}{7}\right) \div \left(\frac{21}{27} - 45\right)$,

(b) $\sqrt[3]{45} + 4.6^2$.

Answer (a) _____ [1]

Answer (b) _____ [1]

2. Correct 0.3968 to

(a) 2 significant figures,

(b) 1 decimal place.

Answer (a) _____ [1]

Answer (b) _____ [1]

3. Given that $\frac{3}{4} \square 1\frac{7}{8} \square 4\frac{1}{6}$,

fill in the boxes with 'x' or '÷' so that the result is $1\frac{2}{3}$.

Answer _____ [2]

For
Examiner's
Use

3

For
Examiner's
Use

4. 15% of a number is 45. Find the number.

Answer _____ [2]

5. Find the HCF and LCM of 102 and 138.

Answer HCF= _____ LCM= _____ [2]

6. Factorise completely,

(a) $7xy^2 + 21y + 14xy$,

(b) $18xy + 9x - 6y - 3$.

Answer (a) _____ [1]

Answer (b) _____ [2]

7. Given that $x = 3(y - 2z)$, find the value of z when $x = 21$ and $y = 42$.

Answer _____ [3]

For
Examiner's
Use

5

For
Examiner's
Use

8. Subtract the sum of $a^3 + 10a^2b$ and $6a^2b - 2a^3 + 9$ from $6a^3 + 7ba^2 - 21$.

Answer _____ [3]

9. What number must be added to 3 and 8 so that the ratio of the first number to the second number is 2 : 5?

Answer _____ [3]

10. (a) Express 7981 as a product of its prime factors, giving your answer in index notation.

(b) Using your answer from part (a), find $\sqrt[3]{7981}$.

Answer (a) _____ [2]

Answer (b) _____ [2]

11. (a) Write down the irrational number(s) from the following $\sqrt{9}$, π , 1.45, $0.\dot{3}$

(b) Arrange the following in descending order.

0.2, $0.2\dot{1}$, $-\frac{1}{3}$

(c) Estimate the value of $(\sqrt{15.98} - 2.09)^2$ correct to 1 significant figure.

Answer (a) _____ [1]

Answer (b) _____ [1]

Answer (c) _____ [2]

12. An object moves 5200 m in 30 minutes. Find its average speed in

(a) km/h,

(b) cm/s.

Answer (a) _____ km/h [2]

Answer (b) _____ cm/s [2]

13. Simplify

(a) $2x \div 3y - \frac{1}{2}x \times \frac{2}{3y}$,

(b) $\frac{x-3}{2} - \frac{2x-5}{4}$

Answer (a) _____ [2]

Answer (b) _____ [3]

14. Given that $a = 2$, $b = -1$ and $c = \frac{1}{2}$, find the value of

(a) $2ab$,

(b) $(4bc - a)(b^2 - c^3)$,

(c) $\frac{12bc}{5a} \div \frac{3a^2}{c}$.

Answer (a) _____ [1]

Answer (b) _____ [2]

Answer (c) _____ [2]

15. Solve the following,

(a) $3x + 4 = 2(7 - 2x)$,

(b) $\frac{14a - 5}{15} = \frac{21 - 12a}{2}$.

Answer (a) _____ [3]

Answer (b) _____ [3]

End of paper

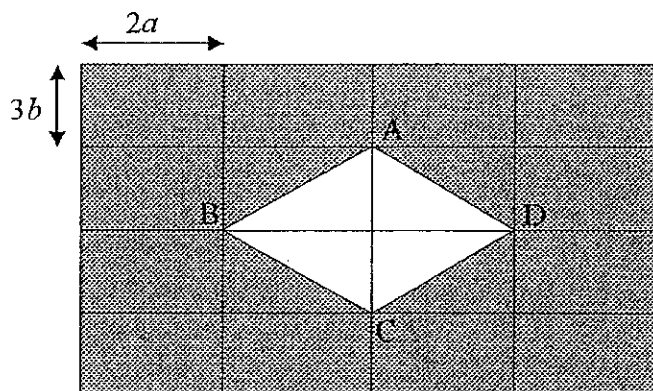
Answer ALL questions in this paper, showing all workings clearly.

1. Singapore Power charges 16.25 ¢ per kilowatt-hour (kWh) for residential use. (Kilowatt-hour is the convenient unit used to find how much electrical energy consumed.)
- (a) Mr Tan uses 523 kWh in January 2008. Find the cost of electricity used in dollars, giving your answer to the nearest dollar. [2]
- (b) Singapore Power adjusted the electricity charges for residential use in February 2008. Mr Tan pays \$93.27 for using 560 000Wh in the month of February. What is the new rate for electricity? Give your answer to the nearest cent. [3]
-

2. (a) In the year 2000, Sandra earned 20% more than what she earned in 1999. In 2001, she earned 15% more than what he earned in 2000. Calculate the total percentage increase in her earnings from 1999 to 2001. [3]
- (b) If she earned \$48000 in 2001, how much did she earn in 1999? Give your answer to the nearest tens. [2]
-

3. Alizah bought 3 sacks of rice at \$10.20 per sack, 4 packets of snacks at \$ 3.50 per packet and 2 tubs of ice cream at \$7.80 per tub.
- (a) Calculate her total bill. [1]
- (b) In 2005, the GST levied is 5%. Calculate the total bill for the same purchase, correct to the nearest cent, in 2005. [2]
- (c) If the GST levied is increased to 7%, calculate the percentage increase in her total bill over 2005, giving your answer corrected to 3 decimal places. [2]
-

4. (a) The figure below is made up of small rectangles each of length $2a$ cm and breadth $3b$ cm. What is the area of the shaded region?



[2]

- (b) The perimeter of a square and an equilateral triangle are $(13x - 2)$ cm and $(7x + 3)$ cm respectively. Express the difference in the length of a side of the square and the length of a side of the triangle in terms of x , in its simplest form. (Hint: An equilateral triangle has 3 equal sides.) [3]

5. A man drives from home at 09 45 to the airport which is 325 km away. He travels at an average speed of 50 km/h.
- (a) Find his arrival time at the airport. [2]
- (b) After sending off his friend, the man drives back at 17 50 and arrives home at 23 10. Calculate his average speed for the return journey. [2]
- (c) Find the total time taken for the whole journey. [1]
- (d) Calculate his average speed in km/h, correct to 1 decimal place, for the whole journey of the two-way trip. [2]

6. (a) At a bus interchange, Bus Service 190 leaves every 6 minutes, Bus Service 187 leaves every 25 minutes and Bus Service 170 leaves every 30 minutes. One bus from each service leaves the interchange at 09 00. At what time will buses from all three services next leave the bus interchange at the same time? [2]
- (b) If one fifth of 2520 is the same as $2^x \times 3^y \times 7^z$, what are the values of x , y and z ? [2]
- (c) Johnny can key-in 15 characters every 3 seconds using his mobile phone.
- (i) How many characters can Johnny key-in every minute? [2]
- (ii) How long would Johnny take to key-in a message consisting of 60 characters? [1]
-

7. (a) The average of 4 numbers is x . If a fifth number is added, the average is 7. What is the fifth number, in terms of x ? [2]
- (b) Cathy has some coins in her savings box. There are x one-dollar coins and 15 more twenty-cent coins than fifty-cent coins. The number of fifty-cent coins is two times as many as the number of one-dollar coins.
- (i) Express the number of fifty-cent coins in terms of x . [1]
- (ii) Express the number of twenty-cent coins in terms of x . [1]
- (iii) Given that Cathy has a total of \$15 in her savings box, find the number of coins of each denomination. [3]
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Marking scheme Sec I Examination Paper 1 2008

- 1 a 4.43 [B1]
 b 24.7 [B1]
- 2 a 0.40 [B1]
 b 0.40 [B1]
- 3 \div, \times [B2]
- 4 Number
 $= \frac{100}{15} \times 45$ [M1]
 $= 300$ [A1]
- 5 $102 = 2 \times 3 \times 17$
 $138 = 2 \times 3 \times 23$
 HCF = 6 [A1]
 LCM = 2346 [A1]
- 6 a $7xy^2 + 21y + 14xy = 7y(xy + 3 + 2x)$ [A1]
 b $6xy + 3x - 2y - 1$
 $= 3x(2y + 1) - (2y + 1)$ [M1]
 $= (2y + 1)(3x - 1)$ [A1]
- 7 $x = 3(y - 2z)$
 $21 = 3(42 - 2z)$ [M1]
 $7 = 42 - 2z$
 $2z = 42 - 7$ [M1]
 $z = \frac{35}{2}$ [A1]
- 8 $(6a^3 + 7ba^2 - 21) - (a^3 + 10a^2b + 6a^2b - 2a^3)$ [M1]
 $= 6a^3 + 7a^2b - 21 - 16a^2b + a^3$ [M1]
 $= 7a^3 - 9a^2b - 21$ [A1]

9

$$\frac{x+3}{x+8} = \frac{2}{5} \quad [M1]$$

$$5(x+3) = 2(x+8) \quad [M1]$$

$$5x+15 = 2x+16$$

$$x = \frac{1}{3} \quad [A1]$$

10 a

$$\begin{array}{r|l} 2 & 1728 \\ 2 & 864 \\ 2 & 432 \\ 2 & 216 \\ 2 & 108 \\ 2 & 54 \\ 3 & 27 \\ 3 & 9 \\ 3 & 3 \\ & 1 \end{array}$$

[M1]

$$1728 = 2^6 \times 3^2 \quad [A1]$$

b

$$\begin{aligned} & \sqrt[3]{1728} \\ & = \sqrt[3]{2^6 \times 3^2} \end{aligned} \quad [M1]$$

$$\begin{aligned} & = 2^2 \times 3 \\ & = 12 \end{aligned} \quad [A1]$$

11 a π [B1]

b $0.2i, 0.2, -\frac{1}{3}$ [B1]

c $(\sqrt{15.98} - 2.09)^2$
 $\approx (\sqrt{16} - 2)^2$ [M1]

$$\begin{aligned} & = (4 - 2)^2 \\ & = 4 \end{aligned} \quad [A1]$$

12 a $\frac{(5200 \div 1000)km}{(30 \div 60)h}$ [M1]

$$= 10.4km / h \quad [A1]$$

$$\begin{aligned} \text{b} \quad & \frac{(5200 \times 100) \text{cm}}{(30 \times 60) \text{s}} && [M1] \\ & = 289 \text{cm/s} && [A1] \end{aligned}$$

answer to 3 sig. fig.

$$\begin{aligned} 13 \quad \text{a} \quad & 2x \div 3y - \frac{1}{2}x \times \frac{2}{3y} \\ & = \frac{2x}{3y} - \frac{2x}{6y} \\ & = \frac{4x - 2x}{6y} && [M1] \end{aligned}$$

$$= \frac{x}{3y} \quad [A1]$$

$$\begin{aligned} \text{b} \quad & \frac{x-3}{2} - \frac{2x-5}{4} \\ & = \frac{2(x-3) - (2x-5)}{4} && [M1] \end{aligned}$$

$$= \frac{2x - 6 - 2x + 5}{4} \quad [M1]$$

$$= -\frac{1}{4} \quad [A1]$$

$$\begin{aligned} 14 \quad \text{a} \quad & 2ab \\ & = 2(2)(-1) \\ & = -4 && [A1] \end{aligned}$$

$$\begin{aligned} \text{b} \quad & (4bc - a)(b^2 - c^3) \\ & = \left[4(-1)\left(\frac{1}{2}\right) - 2 \right] \left[(-1)^2 - \left(\frac{1}{2}\right)^3 \right] && [M1] \end{aligned}$$

$$= -3\frac{1}{2} \quad [A1]$$

$$\begin{aligned}
 \text{c} \quad & \frac{12bc}{5a} \div \frac{3a^2}{c} \\
 & = \frac{12(-1)\left(\frac{1}{2}\right)}{5(2)} \div \frac{3(2)^2}{\frac{1}{2}} \quad [M1] \\
 & = -\frac{1}{40} \quad \text{or} \quad -0.025 \quad [A1]
 \end{aligned}$$

$$\begin{aligned}
 15 \quad \text{a} \quad & 3x + 4 = 2(7 - 2x) \\
 & 3x + 4 = 14 - 4x \quad [M1] \\
 & 3x + 4x = 14 - 4 \quad [M1] \\
 & 7x = 10 \\
 & x = \frac{10}{7} \quad [A1]
 \end{aligned}$$

$$\begin{aligned}
 \text{b} \quad & \frac{14a - 5}{15} = \frac{21 - 12a}{2} \\
 & 2(14a - 5) = 2(21 - 12a) \quad [M1] \\
 & 28a - 10 = 42 - 24a \quad [M1] \\
 & 28a + 24a = 42 + 10 \\
 & 52a = 52 \\
 & a = 1 \quad [A1]
 \end{aligned}$$

Marking scheme for Sec 1E Examination Paper 2 2008

- 1 a Cost
 $= 0.1625 * 520$ [M1]
 $\approx \$85$ [A1]
- b
 $560000Wh = 560kWh$ [M1]
New rate
 $= \frac{93.27}{560}$ [M1]
 $\approx \$0.17/kWh$ [A1]
- 2 a Let x be earnings in 1999.
In 2000, earnings $1.2x$
In 2001, earnings $1.15 \times 1.2x = 1.38x$ [M1]
Percentage increased
 $= \frac{1.38x - x}{x} \times 100\%$ [M1]
 $= 38\%$ [A1]
- b Earnings in 1999
 $= \frac{48000}{1.38}$ [M1]
 $= 34782.60$
 ≈ 34780 [A1]
- 3 a Total bill
 $= 3 \times 10.2 + 4 \times 3.5 + 2 \times 7.8$
 $= 60.20$ [A1]
- b Total bill in 2005
 $= \frac{105}{100} \times 60.20$ [M1]
 $= 63.21$
 ≈ 63.20 [A1]
- c Total bill ins 2007
 $= \frac{107}{100} \times 60.20$ [M1]
 $= 64.414$

Percentage increased

$$\begin{aligned} &= \frac{64.414 - 63.21}{63.21} \times 100 \\ &= 1.905\% \end{aligned}$$

[A1]

- 4 a Area of 1 rectangle = $6ab$
Area of 14 rectangles

$$= 6ab \times 14 \quad [M1]$$

$$= 84ab \quad [A1]$$

b

$$\frac{13x-2}{4} - \frac{7x+3}{3} \quad [M1]$$

$$= \frac{39x-6-28x-12}{12} \quad [M1]$$

$$= \frac{11x-18}{12} \text{ cm} \quad [A1]$$

- 5 a Time taken to travel

$$\begin{aligned} &= \frac{325}{50} \\ &= 6.5h \quad [M1] \end{aligned}$$

Arrival time

$$\begin{aligned} &= 0945 + 0630 \\ &= 1715 \quad [A1] \end{aligned}$$

- b Average speed

$$= \frac{325}{5\frac{1}{3}} \quad [M1]$$

$$= 60\frac{15}{16} \text{ km/h} \quad [A1]$$

- c Total time

$$\begin{aligned} &= 23 \text{ h } 0 \text{ min } 9 \text{ s } 45 \\ &= 13 \text{ h } 25 \text{ min} \quad [A1] \end{aligned}$$

- d Average speed

$$= \frac{325 \times 2}{13 \frac{25}{60}} \quad [M1]$$

$$= 48 \frac{72}{161}$$

$$= 48.4 \text{ km/h} \quad [A1]$$

6 a $6 = 2 \times 3$
 $25 = 5 \times 5$
 $30 = 2 \times 3 \times 5$

$$\text{LCM} = 150 \quad [M1]$$

Next meeting time
 $= 09 \text{ } 00 + 02 \text{ } 30$
 $= 11 \text{ } 30 \quad [A1]$

b $5292 = 2^2 \times 3^3 \times 7^2 \quad [M1]$

$$\therefore x = 2$$

$$y = 3$$

$$z = 2 \quad [A1]$$

ci Rate

$$= \frac{15}{3 \div 60} \quad [M1]$$

$$= 300 \quad [A1]$$

cii Time needed

$$= \frac{60}{300}$$

$$= 0.2 \text{ min} \quad [A1]$$

7 a Sum of 4 number = $4x$

$$\text{Sum of 5 number} = 35 \quad [M1]$$

$$\text{Fifth number} = 35 - 4x \quad [A1]$$

bi Number of 50-cent coins = $2x \quad [B1]$

bii Number of 20-cent coins = $2x + 15 \quad [B1]$

biii $x + 2x(0.5) + (2x + 15)(0.2) = 15 \quad [M1]$

$$x = 5 \quad [M1]$$

There are 5 \$1 coins, 10 50-cent coins and 15 20-cent coins. [A1]

8 a Expenditure = $400 - 2x$ [B1]

b $400 - 2x : 200 + x$ [B1]

c
$$\frac{400 - 2x}{200 + x} = \frac{2}{3} \quad [M1]$$

$1200 - 6x = 400 + 2x$ [M1]

$x = 100$ [A1]

d Savings: Income (Mar)

$300 : 500$ [M1]

$2100 : 3500$ [M1]

Savings in April

$= 1.25 \times 2100$

$= 2625$ [M1]

Spending in April

$= 3500 - 2625$

$= 875$ [A1]