Syd. Tech. High School
August Common Test 2010

Mathematics

Section 2

75 marks
Time allowed for this section is 1 hour and 30 minutes

This section has TWO parts:

Part A Questions 26-80 55 marks
Part B Questions 81-85 20 marks

- Calculators may be used in this section
- Do not commence Section 2 until you are instructed to do so

This paper MUST NOT be removed from the examination room

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STUDENT NAME/NUMBER: .....

Part A

Questions 26 – 80 (55 marks)

Use the Section 2 – Part A Answer Sheet for Questions 26 – 80

Instructions for answering multiple-choice questions

- For Questions 26–75, select the alternative A, B, C or D that best answers the questions. Fill in the response oval completely.

  Sample: 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9

  A ○ B ● C ○ D ○

- If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

  A ● B ⊗ C ○ D ○

- If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word 'correct' and drawing an arrow as follows.

  correct ↙

  A ⊗ B ● C ○ D ○

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26. 'SPARKLE' toothpaste comes in four different sizes.
Which size is the best value ?

A. 75 g for $1.29

B. 110 g for $1.99

C. 150 g for $2.40

D. 175 g for $2.85

---

27. Which of these lines is parallel to $y = 5x - 4$?

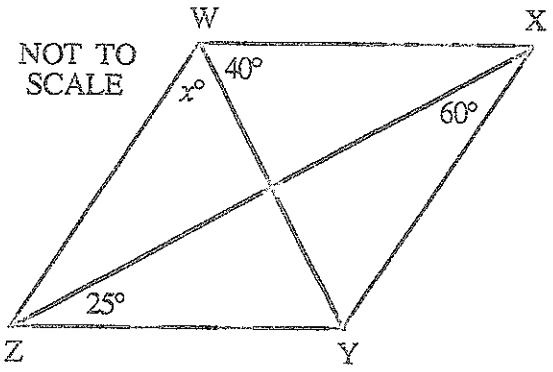
(A) $y = 5x + 4$

(B) $y = -5x + 4$

(C) $y = \frac{1}{5}x - 4$

(D) $y = -\frac{1}{5}x - 4$

28.



WXYZ is a parallelogram.

What is the value of x?

(A) 40

(B) 45

(C) 55

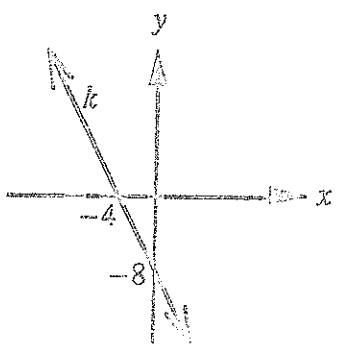
(D) 60

---

29. Simplify $\frac{\sqrt{50}}{10}$

(A) $\sqrt{5}$ (B) $\frac{\sqrt{5}}{5}$ (C) $\frac{5\sqrt{2}}{2}$ (D) $\frac{\sqrt{2}}{2}$

30.



Calculate the gradient of the line k.

(A) -2

(B) $-\frac{1}{2}$

(C) $\frac{1}{2}$

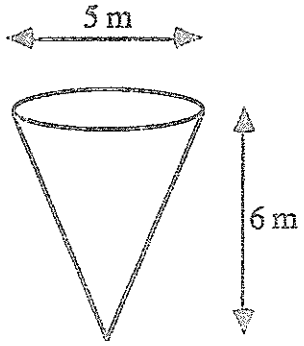
(D) 2

---

31. Simplify $\frac{m^{24}}{(m^2)^4}$

(A) m^3 (B) m^4 (C) m^{16} (D) m^{18}

32.



The volume of this cone is closest to

(A) 39 m^3
(B) 118 m^3
(C) 157 m^3
(D) 471 m^3

33.

A truck travelling from Sydney to Bathurst at a speed of 75 km/h passes this sign. The driver decides to stop and rest when half the trip is completed.

How much longer does he have to wait before stopping?

(A) 8 min (B) 32 min (C) 84 min (D) 120 min

---

34. David scored 120 goals in 12 games, with a best performance of 15 goals.

Consider the following statements:

I. His mean score is 10 goals.

II. His mode score is 15 goals.

Which must be true?

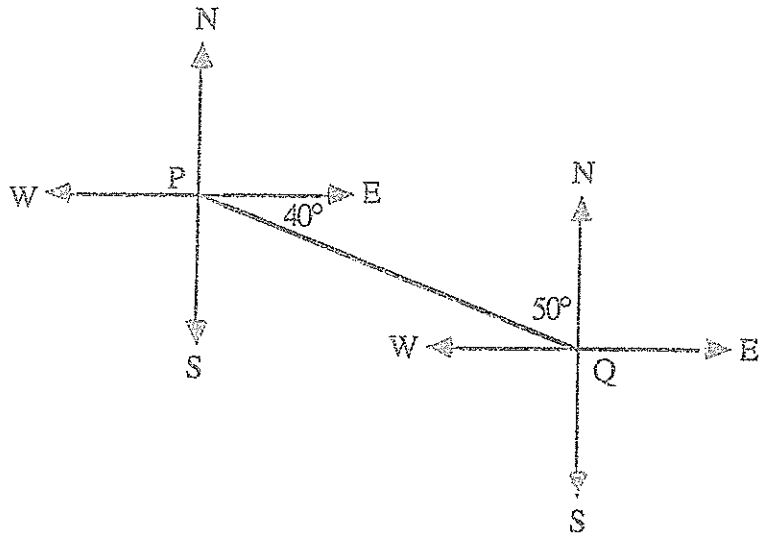
(A) I only (B) II only (C) Both I and II (D) Neither I nor II.

---

35. Simplify $\frac{x}{2} + \frac{2}{x}$

(A) 1 (B) 2 (C) $\frac{x + 2}{2x}$ (D) $\frac{x^2 + 4}{2x}$

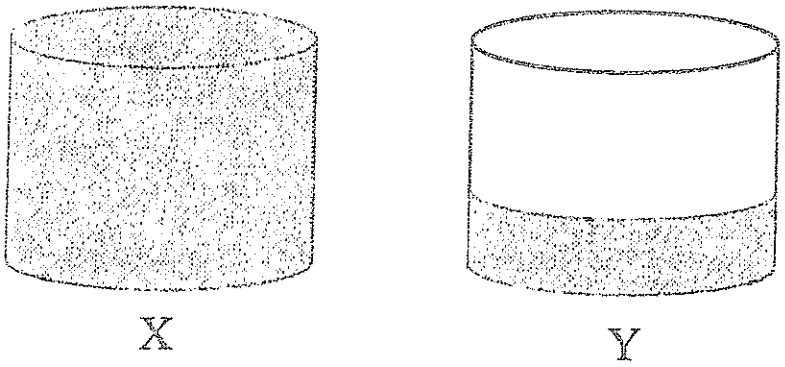
36.



The bearing of P from Q is

(A) 040°
(B) 050°
(C) 130°
(D) 310°

37.



Two identical drums X and Y contain water. Drum X is full and drum Y is $\frac{1}{3}$ full.

Half of the water in drum X is poured into drum Y. Half of the water *now* in drum Y is poured back into drum X.

Drum X is now

(A) $\frac{5}{12}$ full (B) $\frac{2}{3}$ full (C) $\frac{11}{12}$ full (D) full

---

38. x % of \$$a$, *expressed in cents*, is equal to

(A) $\frac{a\,x}{100}$ (B) $a\,x$ (C) $100\,a\,x$ (D) $10\,000\,a\,x$

---

39. $4m^{-2} \div \frac{1}{2}m^{-1} =$

(A) $\frac{2}{m}$ (B) $\frac{2}{m^3}$ (C) $\frac{8}{m}$ (D) $\frac{8}{m^3}$

---

40. There are three batteries in a box. Two are charged and one is flat. If I choose two at random, what is the probability that I will choose the two charged batteries?

(A) $\frac{2}{9}$ (B) $\frac{1}{3}$ (C) $\frac{4}{9}$ (D) $\frac{2}{3}$

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41. If $(x + 1)(2x + 3) = 0$ then $x =$

(A) -1 or -3 (B) -1 or $-\frac{3}{2}$ (C) 1 or 3 (D) 1 or $\frac{3}{2}$

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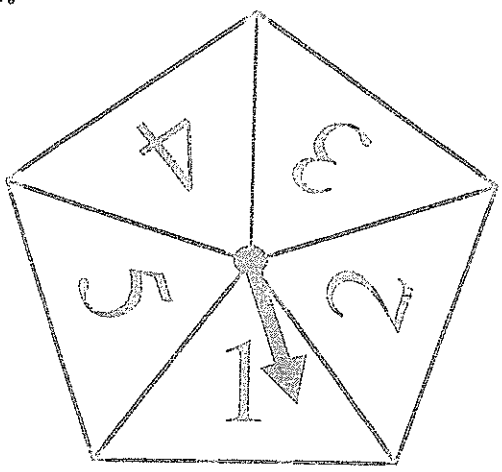
42. A new computer bought for \$2000 depreciates by 40% each year for two years.

Calculate the percentage loss in value over two years.

(A) 16% (B) 36% (C) 64% (D) 80%

43.



The arrow on this regular pentagon is spun 200 times. Each result is recorded as odd or even.

If the probability of each result is equal, which of the following is most likely?

(A) 115 odd and 85 even

(B) 105 odd and 95 even

(C) 100 odd and 100 even

(D) 75 odd and 125 even

---

44. Expand and simplify $(3\sqrt{2} + 4)^2$.

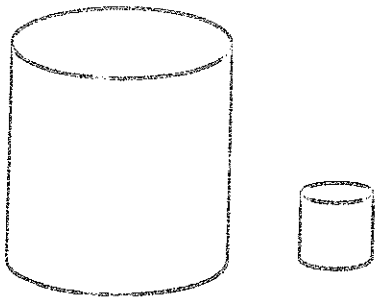
(A) $34 + 12\sqrt{2}$ (B) $34 + 24\sqrt{2}$ (C) $52 + 12\sqrt{2}$ (D) $52 + 24\sqrt{2}$

---

45. Make x the subject of the equation $y = \frac{3x - 2}{5}$

(A) $x = \frac{5y + 2}{3}$ (B) $x = \frac{5y}{3} + 2$ (C) $x = \frac{5(y + 2)}{3}$ (D) $x = \frac{5y - 2}{3}$

46.



The large cylindrical tank has three times the diameter and three times the height of the small tank.

What is the ratio of the volume of the large tank to the volume of the small tank?

(A) 3 : 1 (B) 6 : 1

(C) 9 : 1 (D) 27 : 1

---

47. When the equations $2x + 3y = 20$
$2x - y = 12$

are solved simultaneously, $y =$

(A) 2 (B) 4 (C) 8 (D) 16

---

48. Solve $x^2 - 3x - 1 = 0$.

(A) $x = \frac{-3 \pm \sqrt{5}}{2}$ (B) $x = \frac{-3 \pm \sqrt{13}}{2}$

(C) $x = \frac{3 \pm \sqrt{5}}{2}$ (D) $x = \frac{3 \pm \sqrt{13}}{2}$

49.

Maggie has y lollies.

Lisa has three more lollies than Maggie.

Bart has twice as many lollies as Lisa.

How many lollies do Maggie, Lisa and Bart have altogether?

(A) $y + 9$ (B) $4y + 3$ (C) $4y + 6$ (D) $4y + 9$

---

50. Solve $5 - 3x < 11$.

(A) $x < -2$ (B) $x > -2$ (C) $x < 2$ (D) $x > 2$

51.

Taxable Income $	Tax
$1 - 5 099	Nil
$5 100 - 12 599	0 plus 24c for each $1 over $5 100
$12 600 - 19 499	$1800.00 plus 29c for each $1 over $12 600
$19 500 - 34 999	$3801.00 plus 40c for each $1 over $19 500

Adrienna earns $20 500 in one year. Her allowable deductions total $1500.

From the above table, which of the following expressions represents her total tax?

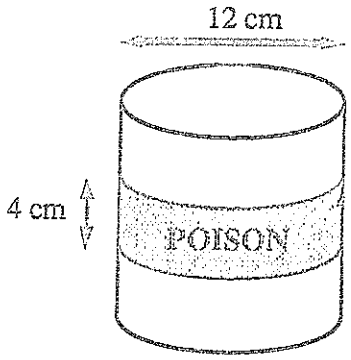
(A) $1800 + 6400 × 29c

(B) $1800 + 6400 × 40c

(C) $3801 + 1000 × 29c

(D) $3801 + 1000 × 40c

52.



A label 4 cm wide just fits around a cylinder with diameter 12 cm.

Calculate the area of the label in terms of π.

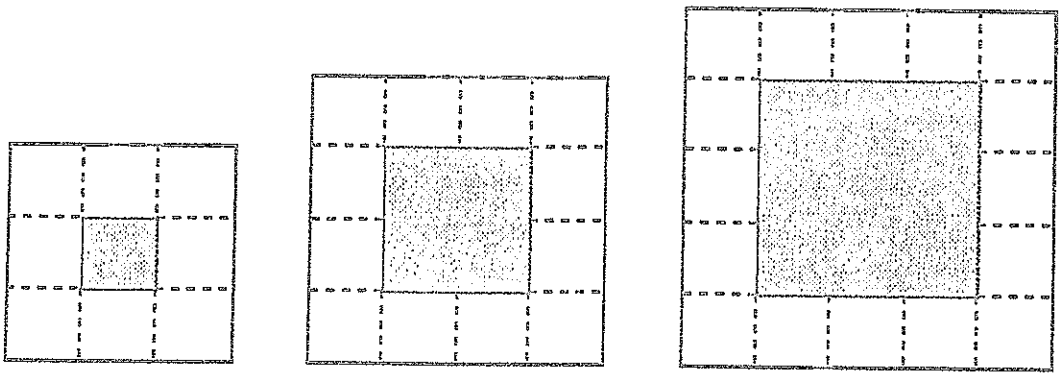
(A) 24π cm^2

(B) 48π cm^2

(C) 96π cm^2

(D) 144π cm^2

53.



Square gardens are to be surrounded by square paving bricks of side one unit, as shown.

Which expression may be used to find the number of paving bricks needed to surround a square garden of side n units.

(A) $4n + 4$ (B) $4n + n^2$ (C) $n^2 + n + 6$ (D) $n^2 - n + 10$

---

54. $x is divided into two parts in the ratio m:n.
The difference, in dollars, between the two parts is

A. $x(m - n)$

B. $\frac{x}{m - n}$

C. $\frac{x}{m} - \frac{x}{n}$

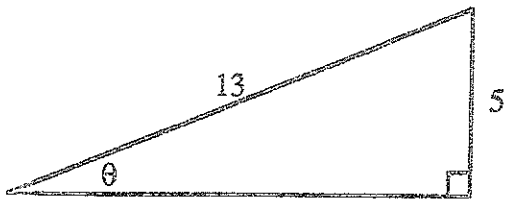
D. $\frac{x(m - n)}{m + n}$

---

55. If $x : y = 1 : 2$
and $x : z = 3 : 5$
then $y : z =$

(A) 2 : 5 (B) 3 : 10 (C) 5 : 6 (D) 6 : 5

56.



Correct to 2 decimal places, $\tan \theta =$

(A) 0.38

(B) 0.42

(C) 2.40

(D) 22.62

---

57. A car is travelling at a speed of v kilometres per hour. This speed can be converted to metres per second by using the expression

(A) $\frac{1000 \times v}{60 \times 60}$

(B) $\frac{60 \times 60 \times v}{1000}$

(C) $1000 \times 60 \times 60 \times v$

(D) $\frac{v}{1000 \times 60 \times 60}$

58.

TEST	KIM'S MARK	CLASS MEAN	CLASS STANDARD DEVIATION
TEST A	86	80	10
TEST B	82	65	15
TEST C	79	60	20
TEST D	70	60	10

On which test did Kim perform best in comparison with the rest of the class ?

A. TEST A B TEST B C. TEST C D. TEST D

59.

Donna is paid an hourly rate based on a 38-hour week and receives time-and-a-half for any hours worked overtime. Last week she worked 44 hours and was paid $2219.34.

What is Donna's normal hourly rate?

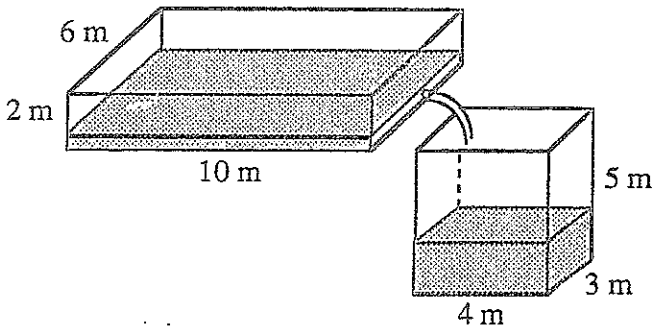
(A) $47.22 (B) $50.44 (C) $54.13 (D) $58.40

---

60. If x is a number between 0 and 1, which of the following has the greatest (maximum) value?

(A) x^{-1} (B) x^0 (C) $x^{1/2}$ (D) x^2

61.



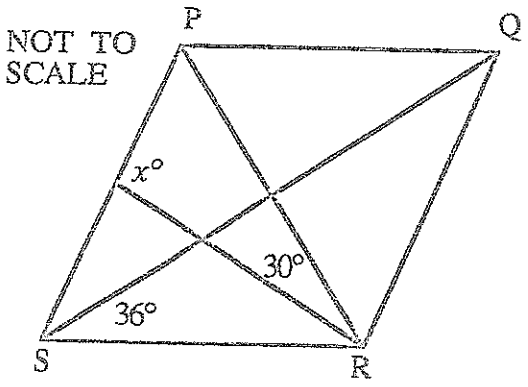
Water is flowing from the top tank to the bottom tank at a constant rate. The depth of water in the top tank is falling at a rate of 10 centimetres per hour.

At what rate is the depth of water rising in the bottom tank?

(A) 2 cm/h (B) 20 cm/h

(C) 25 cm/h (D) 50 cm/h

62.



PQRS is a rhombus. Find the value of x.

(A) 90

(B) 96

(C) 102

(D) 108

---

63. A train left Sydney at x am and arrived at its destination at y pm on the same day.

How many hours did the trip take?

(A) $y - x$ (B) $y + x$ (C) $12 - y - x$ (D) $12 + y - x$

---

64. A tax agent charges \$300 for an 8 hour working day. The agent uses the formula $F = \frac{300x}{8}$ to calculate a fee in dollars.

What does x represent?

(A) the fee, in dollars, per day
(B) the number of days worked
(C) the fee, in dollars, per hour
(D) the number of hours worked

---

65. The local sports store advertised a 45% discount on all tennis racquets. Chris bought a racquet and paid \$88 after discount.

How much did Chris save?

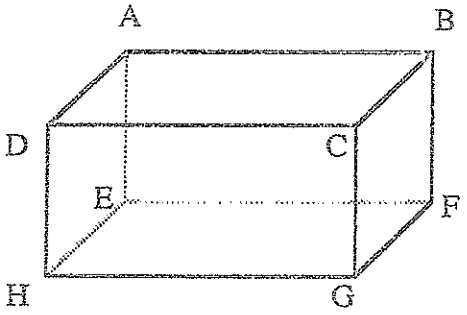
(A) \$16.00 (B) \$39.60 (C) \$48.40 (D) \$72.00

---

66. The gradient of the line $2x - 5y + 1 = 0$ is

(A) -2 (B) $-\frac{2}{5}$ (C) $\frac{2}{5}$ (D) 2

67.



AB = 4 m

BF = 2 m

FG = 3 m

The size of angle BHF to the nearest minute is

(A) 21°48' (B) 23°35' (C) 26°34' (D) 36°52'

---

68. So far this year, Terry has been late for school on 25 days and has not been late on 75 days.

Using this information, what is the probability that Terry will be late on a particular day?

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{3}{4}$

---

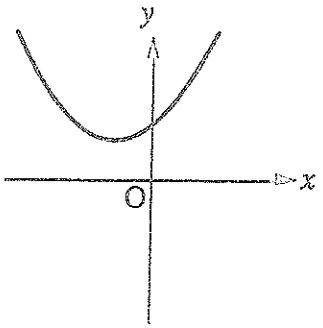
69. Simplify $\frac{x^2 - 1}{(x-1)^2}$

(A) 1 (B) $\frac{-1}{-2x + 1}$ (C) $\frac{x + 1}{x - 1}$ (D) $\frac{x - 1}{x + 1}$

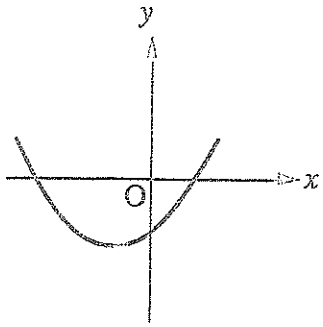
---

70. Which of the following could be the graph of $y = x^2 - 2x + 9$?

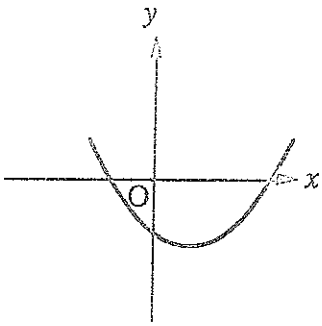
(A)



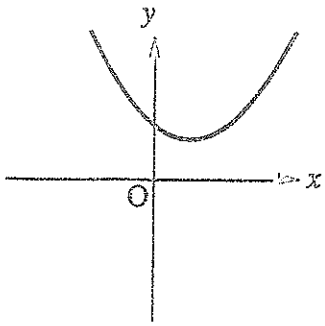
(B)



(C)



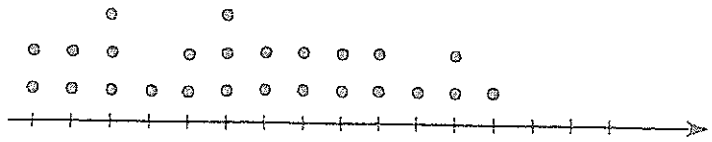
(D)



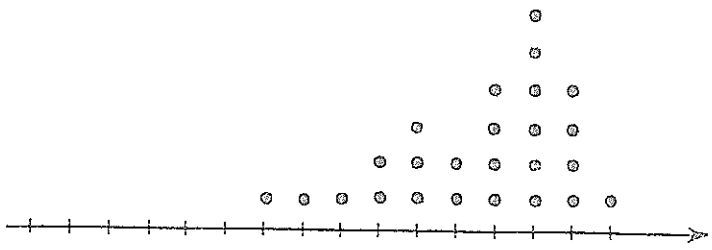
71.

The dot plots below are drawn on the same scale. They show the class scores in tests taken before and after a unit of work was completed.

Before



After



Which statement about the change in scores is correct?

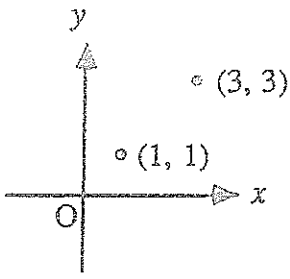
(A) The mean increased and the standard deviation decreased.

(B) The mean increased and the standard deviation increased.

(C) The mean decreased and the standard deviation decreased.

(D) The mean decreased and the standard deviation increased.

72.



The points which are equidistant from (1, 1) and (3, 3) lie on the line with equation

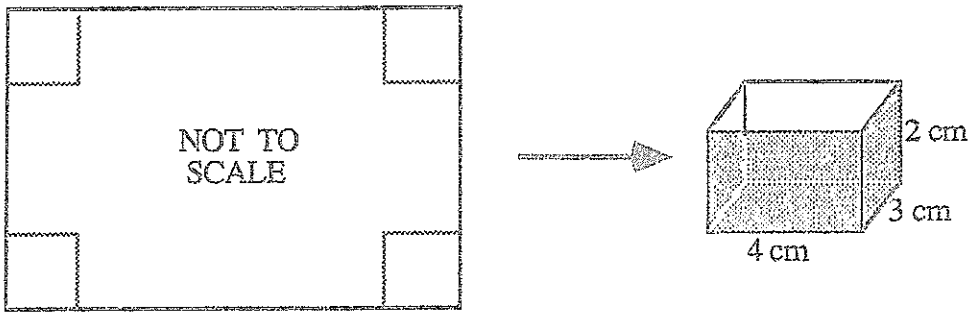
(A) $x = 2$

(B) $y = 2$

(C) $y = x$

(D) $x + y = 4$

73.



The corners of a rectangular sheet of cardboard are cut out and thrown away. The remaining net is folded to form the *open* box shown.

What was the area of the original rectangular sheet?

(A) 40 cm^2 (B) 56 cm^2 (C) 70 cm^2 (D) none of these

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74. A traveller changing money receives 80 cents American for each $1 Australian.

How many Australian dollars must be changed to receive $1000 American?

(A) $800 (B) $1000 (C) $1200 (D) $1250

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75. In the circles below, diameter PQ = diameter MN.
In diagram I, PRQ is an arc of a circle centre S.

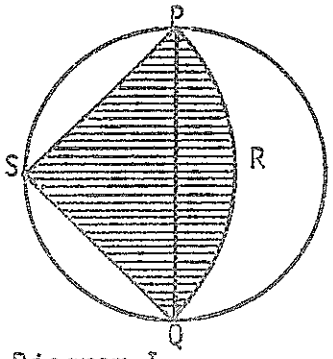


Diagram I

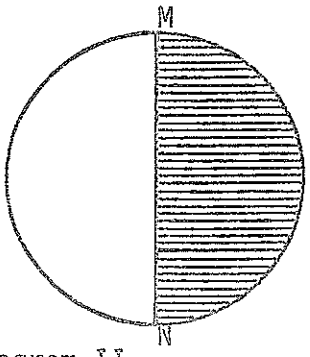


Diagram II

In which diagram is the greater area shaded ?

A. Diagram I

B. Diagram II

C. The shaded areas in both diagrams are the same.

D. Cannot be determined from the information provided.

STUDENT NAME/NUMBER: .....

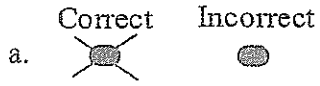
Section 2 (continued)

Instructions for answering Questions 76 – 80

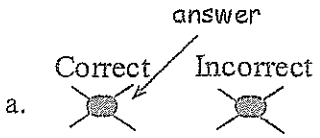
- Questions 76–80 contain options a, b, c and d. Each option may be Correct or Incorrect. In each question, one, two, three or four options may be correct.
- For Questions 76–80, fill in the response ovals on the Section 2 Part A Answer Sheet to indicate whether options a, b, c and d are Correct or Incorrect. You must fill in either the Correct or the Incorrect response oval for each option.

				Correct	Incorrect
Sample:	a.	$2+4=4+2$	a.	●	○
	b.	$2-4=4-2$	b.	○	●
	c.	$2\times4=4\times2$	c.	●	○
	d.	$2\div4=4\div2$	d.	○	●

- If you think you have made a mistake, put a cross through your answer and fill in your new answer.



- If you change your mind and have crossed out what you consider to be the right answer, then indicate your intended answer by writing the word 'answer' and drawing an arrow as follows.



Question 76

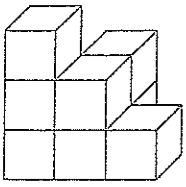
Angles x, y and z are the three angles that make a revolution. x is acute and y is obtuse.

Indicate whether each of the following is *correct or incorrect* for angle z.

a. Angle z could be acute.
b. Angle z could be obtuse.
c. Angle z could be straight.
d. Angle z could be reflex.

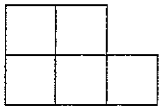
Question 77

This solid contains 8 blocks. It was viewed from the top, the front, the back and the sides.

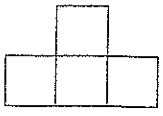


Indicate whether each of the following is *correct* or *incorrect*.

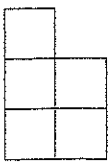
a. This view is possible.



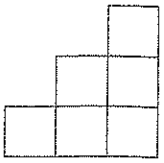
b. This view is possible.



c. This view is possible.



d. This view is possible.



Question 78

The number of goals scored by Spain's soccer team in eight matches is:

2, 2, 2, 3, 3, 4, 4, 5.

In its ninth game the team scored six goals.

Indicate whether each of the following is *correct* or *incorrect.*

a. The mean increases.
b. The mode increases.
c. The median increases.
d. The range increases.

Question 79

You wish to increase the value of the proper fraction $\frac{P}{Q}$.

Indicate whether each of the following is *correct* or *incorrect.*

a. Add 1 to both numerator and denominator.
b. Subtract 1 from both numerator and denominator.
c. Increase the numerator and decrease the denominator.
d. Decrease the numerator and increase the denominator.

Question 80

Hamid is going to use six straws to make a triangle. The straws are 3 cm, 3 cm, 4 cm, 4 cm, 5 cm, and 5 cm. He is going to join two straws together to make each side of the triangle.

Indicate whether each of the following is *correct* or *incorrect.*

a. A scalene triangle is possible.
b. An isosceles triangle is possible.
c. An equilateral triangle is possible.
d. A right-angled triangle is possible.

Section 2 – Part A Answer Sheet

STUDENT NAME/NUMBER:.....

26	A ○	B ○	C ○	D ○
27	A ○	B ○	C ○	D ○
28	A ○	B ○	C ○	D ○
29	A ○	B ○	C ○	D ○
30	A ○	B ○	C ○	D ○
31	A ○	B ○	C ○	D ○
32	A ○	B ○	C ○	D ○
33	A ○	B ○	C ○	D ○
34	A ○	B ○	C ○	D ○
35	A ○	B ○	C ○	D ○
36	A ○	B ○	C ○	D ○
37	A ○	B ○	C ○	D ○
38	A ○	B ○	C ○	D ○
39	A ○	B ○	C ○	D ○
40	A ○	B ○	C ○	D ○
41	A ○	B ○	C ○	D ○
42	A ○	B ○	C ○	D ○
43	A ○	B ○	C ○	D ○
44	A ○	B ○	C ○	D ○
45	A ○	B ○	C ○	D ○
46	A ○	B ○	C ○	D ○
47	A ○	B ○	C ○	D ○
48	A ○	B ○	C ○	D ○
49	A ○	B ○	C ○	D ○
50	A ○	B ○	C ○	D ○
51	A ○	B ○	C ○	D ○
52	A ○	B ○	C ○	D ○
53	A ○	B ○	C ○	D ○
54	A ○	B ○	C ○	D ○
55	A ○	B ○	C ○	D ○
56	A ○	B ○	C ○	D ○
57	A ○	B ○	C ○	D ○
58	A ○	B ○	C ○	D ○
59	A ○	B ○	C ○	D ○
60	A ○	B ○	C ○	D ○

61	A ○	B ○	C ○	D ○
62	A ○	B ○	C ○	D ○
63	A ○	B ○	C ○	D ○
64	A ○	B ○	C ○	D ○
65	A ○	B ○	C ○	D ○
66	A ○	B ○	C ○	D ○
67	A ○	B ○	C ○	D ○
68	A ○	B ○	C ○	D ○
69	A ○	B ○	C ○	D ○
70	A ○	B ○	C ○	D ○
71	A ○	B ○	C ○	D ○
72	A ○	B ○	C ○	D ○
73	A ○	B ○	C ○	D ○
74	A ○	B ○	C ○	D ○
75	A ○	B ○	C ○	D ○

		Correct	Incorrect
76	a.	○	○
	b.	○	○
	c.	○	○
	d.	○	○
77	a.	○	○
	b.	○	○
	c.	○	○
	d.	○	○
78	a.	○	○
	b.	○	○
	c.	○	○
	d.	○	○
79	a.	○	○
	b.	○	○
	c.	○	○
	d.	○	○
80	a.	○	○
	b.	○	○
	c.	○	○
	d.	○	○

ANSWERS

Section 2 – Part A Answer Sheet

STUDENT NAME/NUMBER:.....

26	A ○	B ○	C ●	D ○
27	A ●	B ○	C ○	D ○
28	A ○	B ○	C ●	D ○
29	A ○	B ○	C ○	D ●
30	A ●	B ○	C ○	D ○
31	A ○	B ○	C ●	D ○
32	A ●	B ○	C ○	D ○
33	A ○	B ●	C ○	D ○
34	A ●	B ○	C ○	D ○
35	A ○	B ○	C ○	D ●
36	A ○	B ○	C ○	D ●
37	A ○	B ○	C ●	D ○
38	A ○	B ●	C ○	D ○
39	A ○	B ○	C ●	D ○
40	A ○	B ●	C ○	D ○
41	A ○	B ●	C ○	D ○
42	A ○	B ○	C ●	D ○
43	A ●	B ○	C ○	D ○
44	A ○	B ●	C ○	D ○
45	A ●	B ○	C ○	D ○
46	A ○	B ○	C ○	D ●
47	A ●	B ○	C ○	D ○
48	A ○	B ○	C ○	D ●
49	A ○	B ○	C ○	D ●
50	A ○	B ●	C ○	D ○
51	A ●	B ○	C ○	D ○
52	A ○	B ●	C ○	D ○
53	A ●	B ○	C ○	D ○
54	A ○	B ○	C ○	D ●
55	A ○	B ○	C ○	D ●
56	A ○	B ●	C ○	D ○
57	A ●	B ○	C ○	D ○
58	A ○	B ●	C ○	D ○
59	A ●	B ○	C ○	D ○
60	A ●	B ○	C ○	D ○

61	A ○	B ○	C ○	D ●
62	A ○	B ○	C ○	D ●
63	A ○	B ○	C ○	D ●
64	A ○	B ○	C ○	D ●
65	A ○	B ○	C ○	D ●
66	A ○	B ○	C ●	D ○
67	A ●	B ○	C ○	D ○
68	A ●	B ○	C ○	D ○
69	A ○	B ○	C ●	D ○
70	A ○	B ○	C ○	D ●
71	A ●	B ○	C ○	D ○
72	A ○	B ○	C ○	D ●
73	A ○	B ●	C ○	D ○
74	A ○	B ○	C ○	D ●
75	A ○	B ○	C ●	D ○

		Correct	Incorrect
76	a.	○	●
	b.	●	○
	c.	●	○
	d.	●	○
77	a.	○	●
	b.	●	○
	c.	●	○
	d.	●	○
78	a.	●	○
	b.	○	●
	c.	○	●
	d.	●	○
79	a.	●	○
	b.	○	●
	c.	●	○
	d.	○	●
80	a.	●	○
	b.	●	○
	c.	●	○
	d.	●	○