Practice Exam #8 - C2

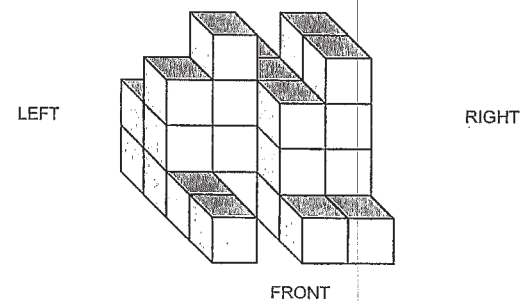1. A linear function *f* is represented in the Cartesian plane below.

The function passes through points A (0, 6) and B (6, −3).
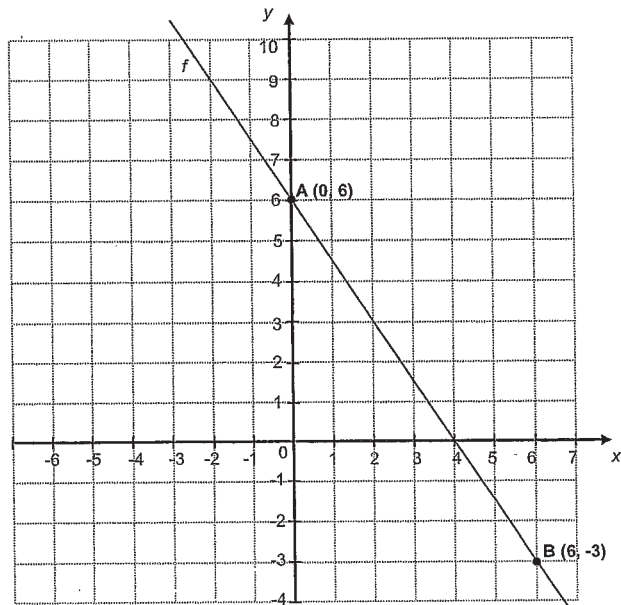
What is the rule of function f ?

A) $f(x) = -\dfrac{3}{2}x + 6$

B) $f(x) = -\dfrac{2}{3}x + 6$

C) $f(x) = 6x - \dfrac{3}{2}$

D) $f(x) = 6x - \dfrac{2}{3}$

2. Given the solid below:

LEFT   RIGHT

FRONT

Which of the following views is correct?

A) Front

B) Left

C) Right

D) Top

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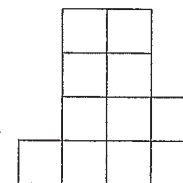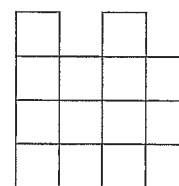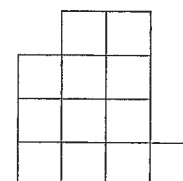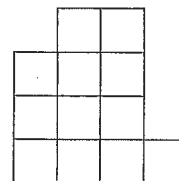
3. Consider the following expression:

$$\frac{\left(5^4 \times 7^{-3}\right)^2}{5^{-6} \times 7^2}$$

Which of the following is equivalent to this expression?

A) $5^0 \times 7^{-3}$

B) $5^2 \times 7^{-4}$

C) $5^{12} \times 7^{-7}$

D) $5^{14} \times 7^{-8}$

4. Consider the following expression:

$$(4y - 8)(4y - 8)$$

Which simplified polynomial is equivalent to this expression?

A) $8y^2 - 16$

B) $8y^2 - 32y - 16$

C) $16y^2 + 64$

D) $16y^2 - 64y + 64$

5. The table below shows various measurements of length.

1	0.125 dm
2	0.52 cm
3	0.025 hm
4	125 000 mm

Which of the following sequences shows the measurements in increasing order?

A) 2, 1, 3, 4

B) 2, 3, 1, 4

C) 2, 4, 1, 3

D) 2, 1, 4, 3

6. A sphere is suspended in a liquid-filled cylinder.

The radius of the sphere is 3 cm.

The radius of the cylinder is 4 cm and its height is 30 cm.

A random point is chosen inside the cylinder.

30 cm
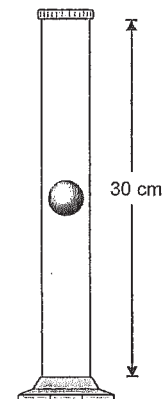
What is the probability that this random point will be located within the volume of the sphere?

A) 3.75%

B) 10%

C) 13.2%

D) 7.5%

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Part B   Questions 7 to 10

In the *Student Booklet*, write your answer in the space provided.
Each question is worth 4 marks.

7. Expand and/or simplify the following expressions

   a) $(-2a + 3b) - (4a + 5b)$ b) $3x(2x + 5)$

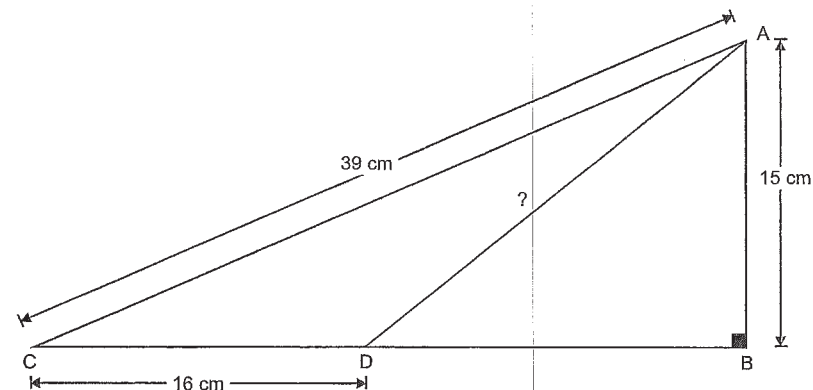   c) $\dfrac{8x^3y^3 + 12x^5y^4}{4x^3y^2}$ d) $(2a^2b^4)^4$

8. Given the following inequality:

$$-15x + 13 \geq -11x - 27$$

   What is the solution of this inequality?

9. Right triangle ABC is shown below.

   In addition, a line segment was drawn from point A to point D, which intersects segment CB.

   What is the measure of line segment AD?

10. Mr. Terry put on a school musical and would like to know the mean age of the 906 people in the audience. The age of each member of the audience was recorded and the results are presented in the table below.

AGES OF AUDIENCE MEMBERS	FREQUENCY
[6, 18[	323
[18, 30[	112
[30, 42[	130
[42, 54[	226
[54, 66[	115
Total	906

   What is the mean age of the audience?

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11. Super Splash Waterpark

Chris is comparing the two different admission options offered at the new park. Each option has an initial entrance fee and a certain cost per ride.

Below is the information about each option:

OPTION A:

The entrance fee when choosing Option A is $26, plus an additional cost per ride. For example, it would cost a total of $83.50 for Chris to go on 10 rides if he chose Option A.

OPTION B:

The relationship between the number of rides and the total cost when choosing Option B is shown in the graph below:

TOTAL COST AT THE AMUSEMENT PARK

Total cost ($) vs Number of rides; points shown: (4, 55) and (12, 89)
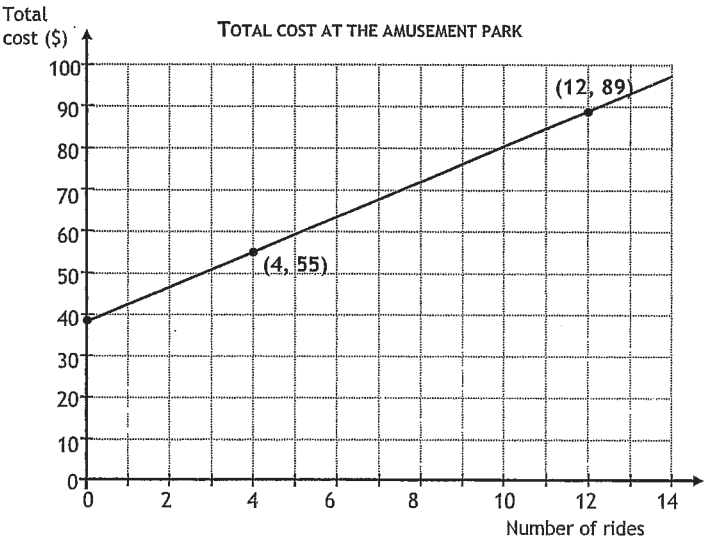
Chris notices that at some point both options cost the same amount.

For how many rides do both options cost the same amount, and what is this cost?

12. Kelly's Candles

Kelly's new hobby is candle-making. She wants to make a beautiful assortment of candles.

She buys 5 blocks of wax measuring 1 dm by 15 cm by 50 mm.

50 mm
15 cm
1 dm
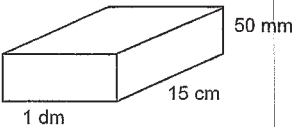
She wants to make 3 candles, formed in the shape of a cylinder topped by a cone, as the one shown below.

3 cm
4 cm
6 cm
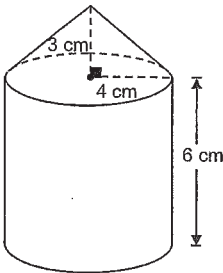
She uses the rest of the wax to make spherical candles. The spherical candles will have the same radius as the cylinder and the cone.

How many spherical candles can Kelly make?

13. Pink Shirt Day

The school's spiritual animator, Ms. Samantha, is ordering t-shirts to celebrate Pink Shirt Day. She would like to calculate the total cost of her order, which includes the cost of the t-shirts and the cost of delivery.

The t-shirt company offers different delivery options for the number of t-shirts per box.

Using the total number of t-shirts Ms. Samantha is ordering, the company presented her with the following graph of packaging options.
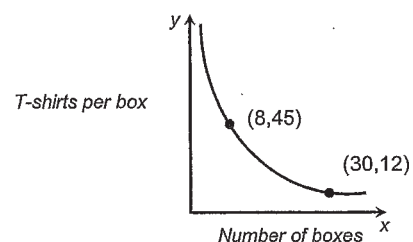
Ms. Samantha wants to have 15 t-shirts per box.

Each t-shirt costs $5.

Additionally, the company uses the following rule to determine the cost of delivery:

$$f(x) = 9.25x + 7.50$$

Where x: number of boxes ordered.
         $f(x)$: total cost of the delivery, in dollars

What will be the total cost of Ms. Samantha's order?

14. Ms. Greco's Tomato Sauce

Ms. Greco recently perfected her secret recipe for tomato sauce.

She will be making more tomato sauce, but her current pot is too small. She is planning to replace it with a larger, similar pot. Both pots are in the shape of a cylinder.

The area of the base of her current pot is 208 cm^2 and its height is 20 cm.
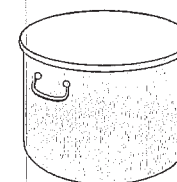
The area of the base of her new pot is 468 cm^2.

CURRENT POT   NEW POT

Area of the base = 208 cm^2
h = 20 cm

Area of the base = 468 cm^2

Ms. Greco stores her tomato sauce in jars that each hold 640 mL of sauce.

How many more full jars of tomato sauce will Ms. Greco be able to fill using her new pot compared to the current pot?

15. Gentille Alouette

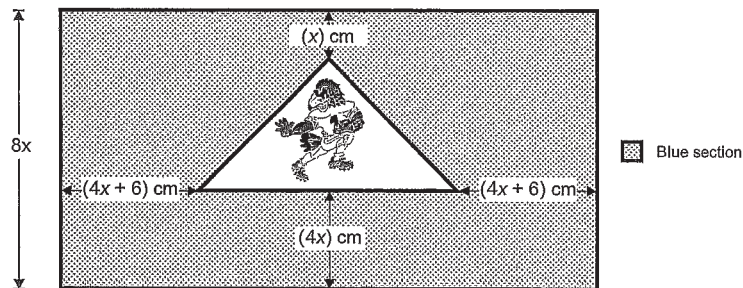The marketing department of the local football team is making new flags.

Each flag consists of an isosceles triangle inside a rectangle.

The team's logo is inside the triangle. The area outside the triangle is blue.

The flag has a total area of $(112x^2 + 128x)$ cm².

The height of the flag is 8x.

Some of the dimensions of the flag are given in the diagram below.


Blue section

What simplified algebraic expression represents the area of the blue section of the flag?

16. Fairserve Dance Academy

Nadia is applying to Fairserve Dance Academy and would like to determine if she will be admitted.

Nadia was evaluated on eight dance routines, but was absent when her last dance score was announced. She does, however, know the results of her first seven dance routines. Nadia also received the following box-and-whisker plot which represents the results of her eight dance routines.

Nadia's first seven scores are: 98, 86, 77, 73, 64, 92, 80.

NADIA'S DANCE
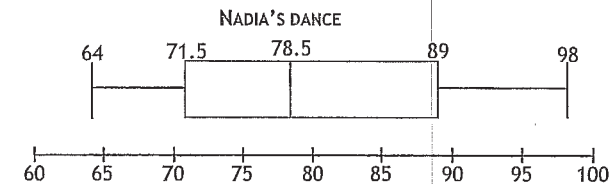
Below is her latest report card. Her grade for interpretive dance corresponds to the mean of her eight dance scores.

COURSE	CREDIT	GRADE
Mathematics	6	85
Interpretive Dance	5	?
English	6	90
French	6	78
Physical Education	3	62
History	4	79

The following criteria must be met for Nadia to be admitted to Fairserve Dance Academy:

- Criterion 1: Only one of her eight dance scores can be below 68%.

- Criterion 2: Her report card average (weighted mean by credit) must be at least 80%.

Will Nadia be admitted to Fairserve Dance Academy?

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Practice Exam #8 – C2 – Solution

Part A   Questions 1 to 6

Darken the letter that corresponds to your answer.

Each question is worth 4 marks.

1. [A] [B] [C] [D]

2. [A] [B] [C] [D]

3. [A] [B] [C] [D]

4. [A] [B] [C] [D]

5. [A] [B] [C] [D]

6. [A] [B] [C] [D]

(#6) $\dfrac{V_{sphere}}{V_{cyl.}} = \dfrac{113.097}{1507.96}$

$V_{sp} = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(3)^3 = 113.097$

$V_{cyl} = \pi r^2 h = \pi(4)^2(30) = 1507.96$

Part B   Questions 7 to 10

Write your answer in the space provided.

Each question is worth 4 marks.

7.

Algebraic Expression	Simplified Algebraic expression
a. $(-2a+3b)+(4a\overline{+}5b)$	$-6a-2b$
b. $3x(2x+5)$	$6x^2+15x$
c. $\dfrac{8x^3y^3+12x^5y^4}{4x^3y^2}$	$2y+3x^2y^2$
d. $(2a^2b^4)^4$	$16a^8b^{16}$

8. The solution is $x < 10$.
   or $]-\infty, 10[$

$-15x+13 > -11x-27$
$-15x > -11x-40$
$-4x > -40$
$x < 10$

4	3	2	1	0

4	2	0

9. The measure of line segment AD is ___25___ cm.

4	0

10. The mean age of the audience is ___32___ years old.

4	0

(#11) Show all your work.

Option A:
$b = 26 \Rightarrow (0,26)$
$(10, 83.50)$
$y = ax+26$
$83.5 = a(10)+26$
$\dfrac{57.5}{10} = \dfrac{100}{10}$
$5.75 = a$
∴ $\boxed{y_A = 5.75x+26}$

Option B:
$(4,55)$ & $(12,89)$
$a = \dfrac{89-55}{12-4} = \dfrac{34}{8} = 4.25$
$b = y_1 - ax_1$
$= 55 - 4.25(4)$
$= 55 - 17$
$= 38$
∴ $\boxed{y_B = 4.25x+38}$

$y_A = y_B$
$5.75x+26 = 4.25x+38$
$1.5x = 12$
$\boxed{x = 8}$

$y_A = 5.75(8)+26$
$= 46+26$
$= 72$

$y_B = 4.25(8)+38$
$= 34+38$
$= 72$

For __8__ rides both options cost the same

amount: $ __72__ .

	Observable indicators correspond to level				
	A	B	C	D	E
Cr. 3	40	32	24	16	8	0
Cr. 2	40	32	24	16	8	0
Cr. 4 Cr. 5	20	16	12	8	4	0

#12

Total volume of wax available:

$$5\,V_{prism} = 5\,A_b h$$
$$= 5(10)(15)(5)$$
$$= \boxed{3750 \text{ cm}^3}$$

Convert dimensions:
1 dm = 10 cm
50 mm = 5 cm

Volume of 3 candles

$$3\left(V_{cone} + V_{cyl}\right) = 3\left(\frac{\pi r^2 h}{3} + \pi r^2 h\right)$$
$$= 3\left(\frac{\pi(4)^2(3)}{3} + \pi(4)^2(6)\right)$$
$$= 3\left(\underset{50.27}{16\pi} + \underset{301.6}{96\pi}\right)$$
$$= 3\left(112\pi\right)$$
$$= 3\left(351.86\right)$$
$$= \boxed{1055.58 \text{ cm}^3}$$

Remaining wax = $3750 - 1055.58 = \boxed{2694.42 \text{ cm}^3}$

$$V_{sphere} = \frac{4\pi r^3}{3}$$
$$= \frac{4\pi(4)^3}{3}$$
$$= 85.\overline{3}\pi$$
$$= \boxed{268.08 \text{ cm}^3}$$

Sphere candles:

$$\frac{2694.42}{268.08} = \boxed{10 \text{ candles}}$$

Kelly can make ___10___ spherical candles.

	Observable indicators correspond to level					
	A	B	C	D	E	
Cr. 3	40	32	24	16	8	0
Cr. 2	40	32	24	16	8	0
Cr. 4 Cr. 5	20	16	12	8	4	0

#13

① Cost of T-shirt:

Rational function $y = \frac{K}{x}$

x: # boxes
y: T-shirt per box
K: # T-shirts

$K = x \cdot y$
$= 8(45) = 360$
or $30(12) = 360$

$$\therefore \boxed{y = \frac{360}{x}}$$

if $y = 15$ t-shirts per box
$$\therefore x = \frac{360}{15} = 24 \text{ boxes}$$

Cost of t-shirts $= 360(5) = \boxed{\$1800}$
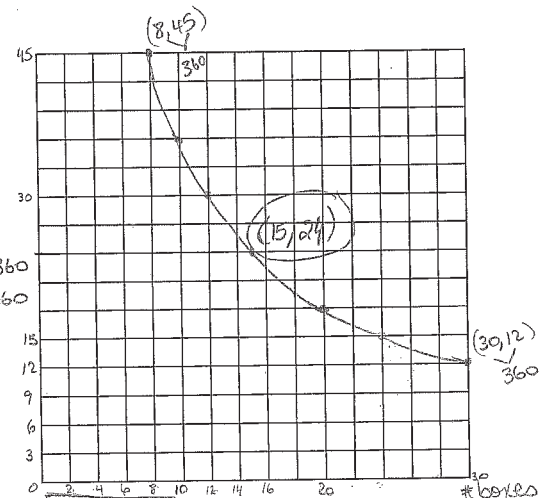
② Cost of delivery:

$$f(x) = 9.25x + 7.50$$
$$= 9.25(24) + 7.50$$
$$= \boxed{\$229.5}$$

Total Cost $= 1800 + 229.5$
$$= \boxed{\$2029.5}$$

(8, 45), 360
(15, 24)
(30, 12), 360

#boxes

The total cost of Ms. Samantha's order will

be $ ___2029.5___.

	Observable indicators correspond to level					
	A	B	C	D	E	
Cr. 3	40	32	24	16	8	0
Cr. 2	40	32	24	16	8	0
Cr. 4 Cr. 5	20	16	12	8	4	0

#14

K ^{sides}	K^2 ^{areas}	K^3 ^{volumes}
	$\frac{468}{208}$	
1.5	$= 2.25$	3.75

given

height of bigger Pot

$(20)(1.5) = 30$ cm

Volume of bigger Pot

$V_{cyl} = \pi r^2 h$ or $A_b h$

$= 468(30)$

$= \boxed{14040 \text{ cm}^3}$

jars $= \frac{14040}{640} = 21.94$

640 mL $= 640$ cm^3
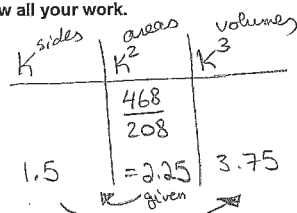
∴ $\boxed{21 \text{ jars}}$

small Pot

$r = 8.14$
$h = 20$
$A_b = 208$
$V = 4160$

big Pot

$r = 12.21$
$h = 30$
$A_b = 468$
$V = 14040$

V Small Pot:

$V_{cyl} = A_b h$

$= 208(20)$

$= \boxed{4160 \text{ cm}^3}$

jars $= \frac{4160}{640}$

$= 6.5$

∴ $\boxed{6 \text{ jars}}$

∴ # of extra jars to fill

$21 - 6 = \boxed{15 \text{ jars}}$

OR $\frac{V_{Big} - V_{small}}{V_{jar}} = \frac{9880}{640} = 15.44 \rightarrow 15$ jars

Ms. Greco will be able to fill ___**15**___ more full jars of tomato sauce using her new pot compared to her current pot.

	Observable indicators correspond to level					
	A	B	C	D	E	
Cr. 3	40	32	24	16	8	0
Cr. 2	40	32	24	16	8	0
Cr. 4 Cr. 5	20	16	12	8	4	0

#15

Area of flag $= b \cdot h$ ⟹ $b = \frac{A}{h}$

$b = \frac{112x^2 + 128x}{8x}$

flag's base $= \boxed{(14x + 16)}$ cm

Dimensions of triangle

Base $= (14x+16) - (4x+6 + 4x+6)$

$= 14x+16 - (8x+12)$

△ $\boxed{b = 6x + 4}$

height $= 8x - (x + 4x)$

$= 8x - 5x$

△ $\boxed{h = 3x}$

Area of triangle $= \frac{bh}{2} = \frac{3x(6x+4)}{2} = \frac{18x^2 + 12x}{2} = 9x^2 + 6x$

Area of Blue $=$ Area of flag $-$ Area of triangle

$= (112x^2 + 128x) - (9x^2 + 6x)$

$= \boxed{103x^2 + 122x}$

The simplified algebraic expression that represents the area of the blue section of the flag is ___$103 x^2 + 122x$___ cm².

	Observable indicators correspond to level					
	A	B	C	D	E	
Cr. 3	40	32	24	16	8	0
Cr. 2	40	32	24	16	8	0
Cr. 4 Cr. 5	20	16	12	8	4	0

(#16) reorder scores: $64, \downarrow 73, 77 / 80, 86 / 92, 98$

$\quad\quad\quad\quad\quad\quad\quad\quad 71.5 \quad\quad 78.5 \quad 89\checkmark$

$\quad\quad\quad\quad\quad\quad\quad\quad Q_1 \quad\quad Q_2 \checkmark \quad Q_3$

8

4 / 4

2|2 2|2

The missing score must be $\boxed{70}$: $\dfrac{70+73}{2} = 71.5 \neq Q_1$

$\bar{X} = \dfrac{64+70+73+77+80+86+92+98}{8} = \dfrac{640}{8} = \boxed{80} \rightarrow$ Inerpretive Dance

Nadia's weighted average:

$\Sigma = 6(85) + 5(80) + 6(90) + 6(78) + 3(62) + 4(79)$

$\Sigma = 510 + 400 + 540 + 468 + 186 + 316 = 2420$

$\bar{X} = \dfrac{\Sigma \text{ data}}{\Sigma \text{ # Credits}} = \dfrac{2420}{30} = 80.\overline{6} \%$

☑✓ Yes, Nadia will be admitted to Fairserve Dance Academy.

☐ No, Nadia will not be admitted to Fairserve Dance Academy.

	Observable indicators correspond to level					
	A	B	C	D	E	
Cr. 3	40	32	24	16	8	0
Cr. 2	40	32	24	16	8	0
Cr. 4 Cr. 5	20	16	12	8	4	0

Justification:

Criteria 1: only one mark (64) < 68%

Criteria 2: her weighted mean (80.7 > 80)