Released Assessment Questions, 2016

ANSWERS

Grade 9 Assessment of Mathematics • Academic

DIRECTIONS

Answering Multiple-Choice Questions

Answer all multiple-choice questions. If you fill in more than one answer to a question, or leave a question blank, the question will be scored zero. Incorrect answers will also be scored zero.

Answering Open-Response Questions

Do all of your work for each question in the space provided for the question **only.**

Write your solutions, including all calculations, clearly and completely.

Record ALL your answers to multiple-choice and open-response questions in this booklet.

ATTENTION:

There are more open-response questions in this booklet than a regular booklet.

Education Quality and Accountability Office

E🇶AO

You are now ready to start.

Remember to write your answers in your *Answer Booklet*.

1 A ball is dropped from a height of 25 m. The ball's height, H, in metres, after n bounces is represented by the equation below.

$$H = 25\left(\frac{1}{2}\right)^n$$

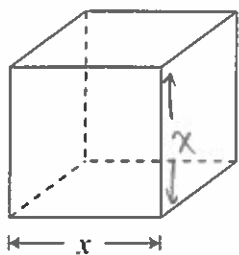What is the height of the ball after 4 bounces?

a $\frac{25}{16}$ m

b $\frac{25}{8}$ m

c $\frac{25}{4}$ m

d $\frac{25}{2}$ m

(handwritten)
$H = 25\left(\frac{1}{2}\right)^4$

$H = 25\left(\frac{1}{16}\right)$

$H = \frac{25}{16}$

2 A cube with a given side length is pictured below.

Which algebraic expression represents the area of **one face** of the cube?

a $2x$

b $4x$

c x^2

d x^3

(handwritten)
$A = lw$
$= (x)(x)$
$= x^2$

3 A school is planning a car wash to raise $600.

• There will be 8 teams.

• Each team will wash 2 cars per hour.

• The car wash will last $5\frac{1}{2}$ hours.

• Each team will take two 15-minute breaks.

(handwritten) = 0.5 hour

How much should the school charge per car to raise exactly $600?

a $15.00

b $7.50

c $6.82

d $6.25

(handwritten)
Total Raised $= 2(5-0.5) \times 8 \times p$
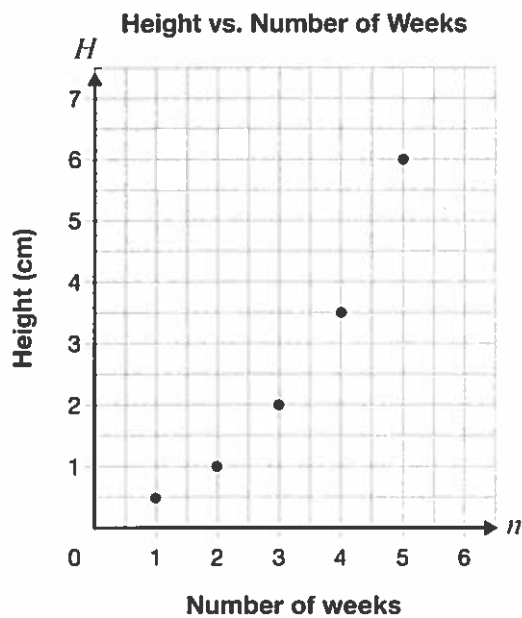$600 = 80p$
$\frac{600}{80} = \frac{80p}{80}$
$p = 7.50$

4 Which of the following is equivalent to $3(5x - 1) - 2(3x + 5)$?

a $9x - 13$

b $9x + 4$

c $21x - 13$

d $21x + 4$

(handwritten)
$= 15x - 3 - 6x - 10$
$= 9x - 13$

5 Information about the relationship between the height of a plant and time is shown on the grid below.

Height vs. Number of Weeks

Which table of values shows only information about this relationship?

a

Number of weeks	Height (cm)
1	2
2	3
6	5

b

Number of weeks	Height (cm)
2	1
3	2
5	6

c

Number of weeks	Height (cm)
1	1
2	2
4	7

d

Number of weeks	Height (cm)
2	1
3	2
4	4

6 Two golf courses offer student memberships. Information about the (linear) relationships between the total cost, C, in dollars, and the number of games played, n, at these two golf courses is given below.

First Golf Course

Part of →
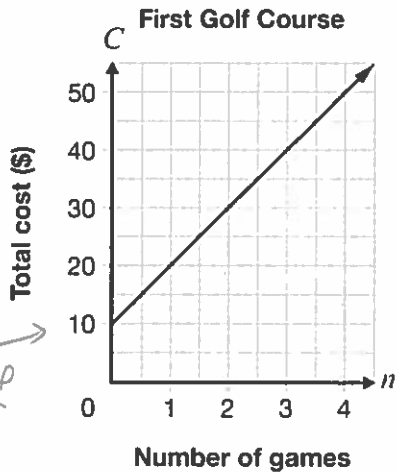
Number of games

Second Golf Course

Number of games, n	Total cost, C ($)
3	51
5	85
9	153
12	204

$$M = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{85 - 51}{5 - 3}$$
$$= \frac{34}{2}$$
$$= 17$$

Which of the following statements correctly describes the two relationships?

~~a~~　They are both direct variations.

~~b~~　The first is a ~~direct~~ variation, and the second is a partial variation with an initial value of $17.

ⓒ　The first is a partial variation ✓ with an initial value of $10, and the second is a direct variation.

~~d~~　The first is a partial variation ✓ with an initial value of $10, and the second is a partial variation with an initial value of $17.
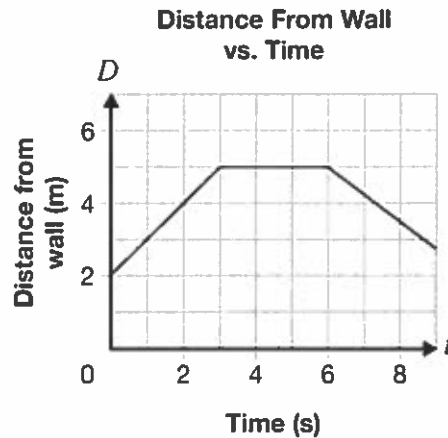
$$y = mx + b$$
$$51 = (17)(3) + b$$
$$51 = 51 + b$$
$$\therefore b = 0 \quad \text{so, second is } \underline{direct}$$

7 The graph below represents Joe's distance from a wall as he walks.

Distance From Wall vs. Time

Time (s)

Which statement could describe Joe's walk?

~~a~~　Joe walks toward the wall, stands still and then walks away from the wall.

ⓑ　Joe walks away ✓ from the wall, stands still ✓ and then walks toward ✓ the wall.

~~c~~　Joe walks toward the wall, stands still and then continues to walk toward the wall.

~~d~~　Joe walks away ✓ from the wall, stands still ✓ and then continues to walk away from the wall. ✗

8 Consider the graph below.

$M = \dfrac{rise}{run}$

$= \dfrac{-1}{0.5}$

$= -2$
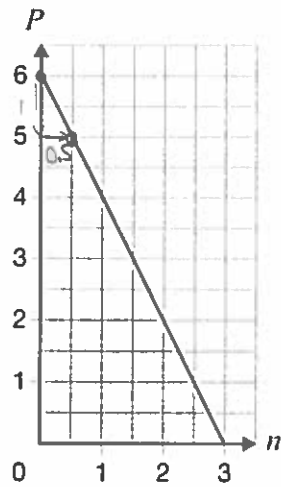
Which of the following is an equation representing this graph?

a $P = 2n + 6$

b $P = \dfrac{1}{2}n + 6$

c $P = -2n + 6$

d $P = -\dfrac{1}{2}n + 6$

Go to the *Answer Booklet* and complete the six open-response questions before continuing with question 15.

9 Open-Response

10 Open-Response

11 Open-Response

12 Open-Response

13 Open-Response

14 Open-Response

Please read the questions in the *Question Booklet*; then fill in your answers below.

To indicate your answer, **use a pencil to fill in the appropriate circle below completely.**

Like this: ●

Not like this: ⊗　✓　⊖　◉

Cleanly erase your answer if you wish to change it and fill in the circle for your new answer.

Fill in only **one** circle for each question.

1 ● ○ ○ ○

2 ○ ○ ● ○

3 ○ ● ○ ○

4 ● ○ ○ ○

5 ○ ● ○ ○

6 ○ ○ ● ○

7 ○ ● ○ ○

8 ○ ○ ● ○

9 Floored Areas

The diagram of the floor shown below has algebraic expressions for the lengths of its sides, in metres.
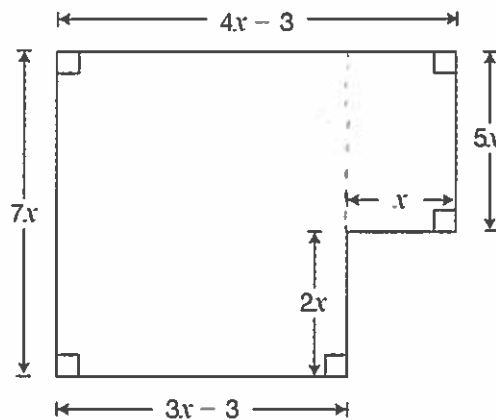
Determine an unsimplified expression for the **total area** of the floor, A, in m^2.

$$A = \underline{(7x)(3x-3) + (x)(5x)}$$

Simplify your expression fully. Show your work.

$A = 21x^2 - 21x + 5x^2$

$= 26x^2 - 21x$

OR $A = 5x(4x-3) + 2x(3x-3)$

$= 20x^2 - 15x + 6x^2 - 6x$

$= 26x^2 - 21x$

OR $A = 5x(x) + 2x(3x-3) + 5x(3x-3)$

$= 5x^2 + 6x^2 - 6x + 15x^2 - 15x$

$= 26x^2 - 21x$

🔟 Folding Time

A piece of paper is folded in half, which results in two layers of paper. Then the paper is folded in half again to make four layers, and so on.
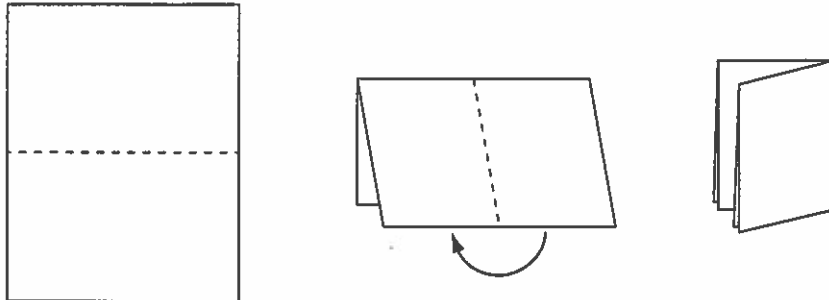
The number of layers and the number of folds are recorded in the chart.

Number of folds	Number of layers
0	1
1	2
2	4
3	8
4	16

Determine whether this relationship is linear or non-linear.

Circle one: Linear   ⟨Non-linear⟩

Justify your answer.

You have the option of using the grid if you wish.

Every time you fold the paper, the number of layers doubles.

The points result in a curve when plotted, therefore it is non-linear.

Number of Layers vs. Number of Folds
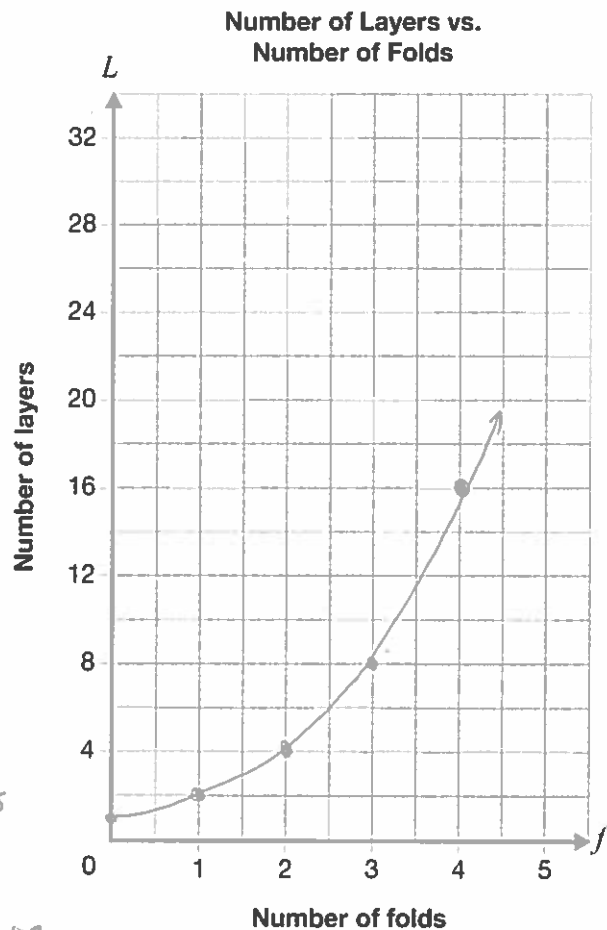
11 Theatre Programs

A company charges schools to print programs for school plays. Information about the linear relationship between the total cost and number of programs printed is shown below.

$M = \dfrac{y_2 - y_1}{x_2 - x_1}$

$(x) \qquad (y)$

Number of programs, n	Total cost, C ($)
350	220
500	250
750	300

$= \dfrac{250 - 220}{500 - 350}$

$= \dfrac{30}{150}$

$= \dfrac{1}{5}$ or 0.20 ← Cost per program

$y = mx + b$

$220 = \frac{1}{5}(350) + b$

$220 = 70 + b$

$220 - 70 = b$

$b = 150$ ← Initial fee

Determine an equation to represent this relationship.

$\underline{\qquad C = 0.2n + 150 \qquad}$

Show your work.

You have the option of using the grid if you wish.
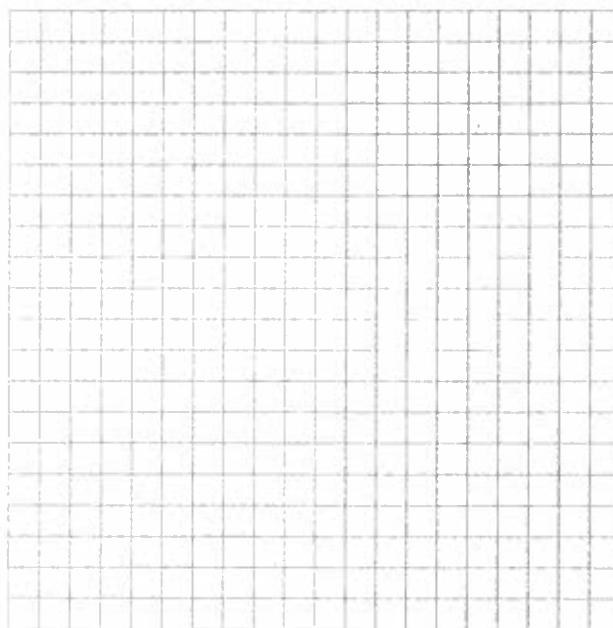
12 Standard Lines

Two lines are represented by the equations below.

$$\text{Line 1:}\quad x - 2y + 6 = 0 \qquad\qquad \text{Line 2:}\quad 3x + 6y - 18 = 0$$

Determine which line could be represented by $y = -\frac{1}{2}x + 3$.

Circle one: Line 1 (Line 2) Both

Justify your answer. Include information for both Line 1 and Line 2.

Convert Line 1 & Line 2 to y=mx+b form to compare

$x - 2y + 6 = 0$

$x + 6 = 2y$

$\frac{1x}{2} + \frac{6}{2} = y$

$\frac{1}{2}x + 3 = y$

(or)

$y = \frac{1}{2}x + 3$

↖ Slope is not negative ∴ cannot be line 1.

$3x + 6y - 18 = 0$

$6y = -3x + 18$

$\frac{6y}{6} = \frac{-3x}{6} + \frac{18}{6}$

$y = -\frac{1}{2}x + 3$

↖ slope & y-intercept are the same ∴ line 2 can represent $y = -\frac{1}{2}x + 3$

(OR) Convert $y = -\frac{1}{2}x + 3$ into standard form

$2(y) = 2\left(-\frac{1}{2}x\right) + 2(3)$

$2y = -x + 6$

$x + 2y - 6 = 0$ ← can see here it doesn't match line 1.

$3x + 6y - 18 = 0$ ↙ multiply each term by 3

↖ now you can see it is the same as line 2.

13 Terrific Ts

A school orders T-shirts from Terrific Ts. The total cost is made up of a set-up fee of $115 and a cost of $3 per T-shirt.

Terrific Ts requires a minimum order of 25 T-shirts. The school can spend a maximum of $800.

Determine all the possible values of the total cost, C, and the number of T-shirts, n, for this situation.

Show your work.

$$C = 3n + 115$$

Max → $800 = 3n + 115$ Min → 25

$$800 - 115 = 3n$$
$$685 = 3n$$
$$\frac{3n}{3} = \frac{685}{3}$$
$$n = 228.\overline{3} \rightarrow$$ round down to 228
because they can't fully purchase the 229th shirt.

The possible values of n in this situation are $\underset{\text{(minimum)}}{25} \leq n \leq \underset{\text{(maximum)}}{228}$.

Min → $C = 3n + 115$
$$C = 3(25) + 115$$
$$C = 75 + 115$$
$$C = \$190$$

Max → $C = 3(228) + 115$
$$C = 684 + 115$$
$$C = \$799$$

The possible values of C in this situation are $\underset{\text{(minimum)}}{\$190} \leq C \leq \$799$.

14 Six and Five Sides

A regular hexagon and a regular pentagon are joined as shown below.
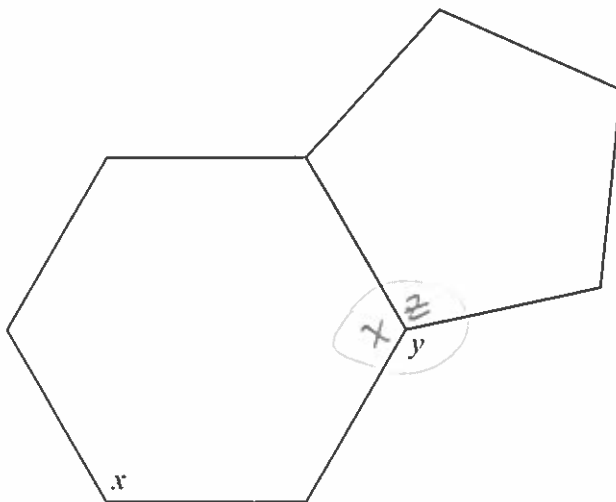
Complete the table below with the values of x and y. Justify your answer using geometric properties.

Value	Justification using geometric properties
$x =$ ___120°___	$x = \dfrac{\text{Total interior sum}}{\# \text{ of sides}}$ $= \dfrac{180(n-2)}{n}$ $= \dfrac{180(6-2)}{6}$ $= \dfrac{720}{6}$ $\Rightarrow x = 120°$
$y =$ ___132°___	$z = \dfrac{180(n-2)}{n}$ $x + y + z = 360°$ $= \dfrac{180(5-2)}{5}$ $120 + y + 108 = 360$ $= \dfrac{540}{5}$ $y = 360 - 108 - 120$ $= 108°$ $y = 132°$ (the three angles create a circle which has 360°)

15 Information about four different linear
relationships between C and n is shown below.

$m = \frac{\Delta y}{\Delta x}$
$= \frac{40}{8}$
$= 5$ ✓

n	C
0	50
8	90
16	130

8 ⟨ ⟩ 40

n	C
10	30
12	35
14	40

2 ⟨ ⟩ 5 $m = \frac{5}{2}$ ✗

$m = \frac{rise}{run}$
$= \frac{5}{2}$ ✗

$M = 0$ ✗

How many of the linear relationships have
a rate of change of 5?   = slope

a   4

b   3

c   2

(d)   1

16 Which graph shows a line that is <u>perpendicular</u> to the line $y = \frac{4}{3}x - 4$?

negative
reciprocal
Slope

$m_\perp = \frac{-3}{4}$

a

positive
slope

b

$M = \frac{-3}{4}$

−3

4

c

$M = \frac{-4}{3}$

d

positive
slope
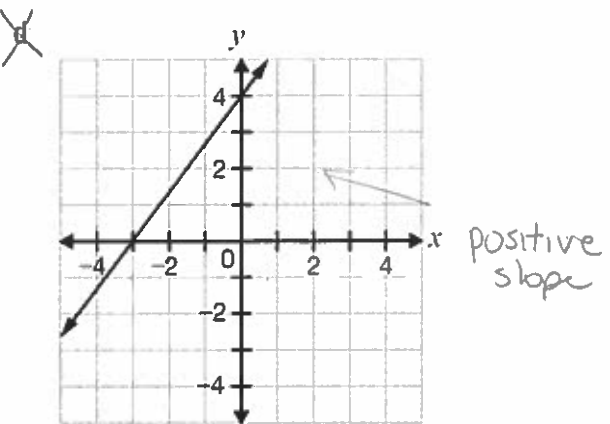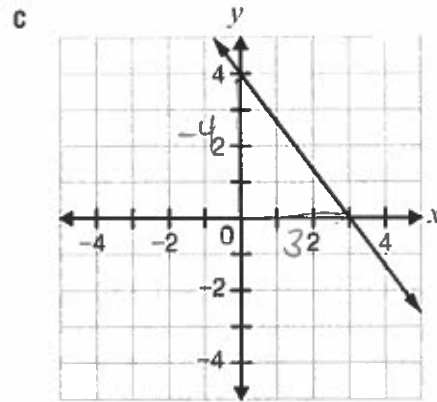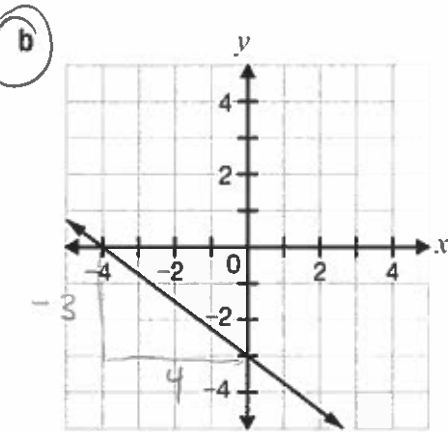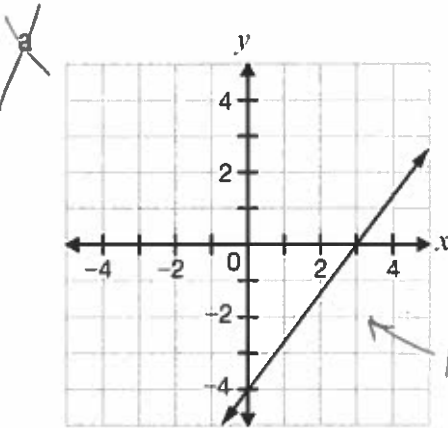
17 What is an equation of the line
• perpendicular to the line represented by
$y = -\frac{3}{2}x + 1$ and

neg. reciprocal — slope to

$M_\perp = \frac{2}{3}$

• with the same y-intercept as the line
represented by $y = 7 + 5x$?

y-intercept is 7

a $y = \frac{2}{3}x + 7$

~~**b**~~ $y = \frac{2}{3}x + 5$

c $y = -\frac{2}{3}x + 7$

~~**d**~~ $y = -\frac{2}{3}x + 5$

18 The total cost to repair a fridge, C, in
dollars, can be represented by the equation
$C = 60t + 30$, where t is the repair time in
hours.

Which of the following statements is true
about this relationship?

~~**a**~~ The hourly rate is $90.

~~**b**~~ The fixed fee is $90.

c The hourly rate is $60, and the fixed fee
is $30. ✓

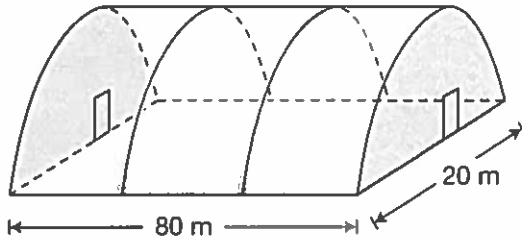**d** The hourly rate is $30, and the fixed fee
is $60.

19 What is the area of the shape represented
below?

14 cm

8 cm

12 cm

20 cm

A_2

A_1
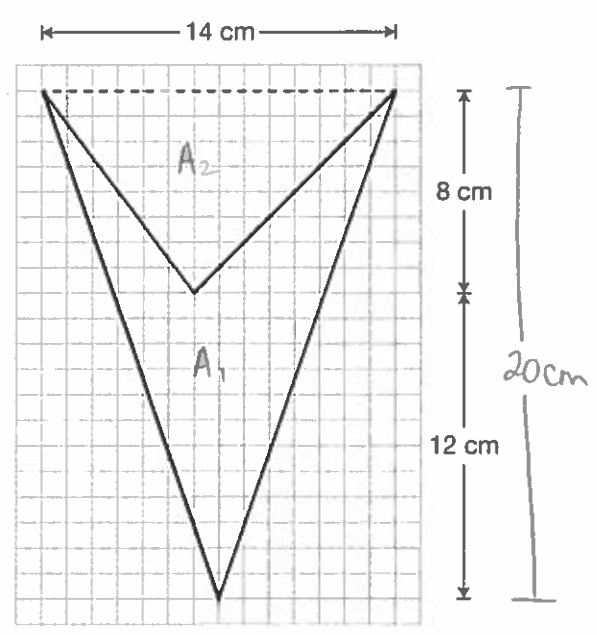
a 28 cm²

b 56 cm²

c 84 cm²

d 168 cm²

$A = A_1 - A_2$

$= \dfrac{(14)(20)}{2} - \dfrac{(14)(8)}{2}$

$= 140 - 56$

$= 84\,cm^2$

20 This diagram shows a greenhouse that is built in the shape of a half-cylinder.

Material to cover the roof costs \$3/m². The shaded ends will not be covered. Which is closest to the cost of covering the roof?

a \$7540

b \$12 570

c \$15 080

d \$37 700

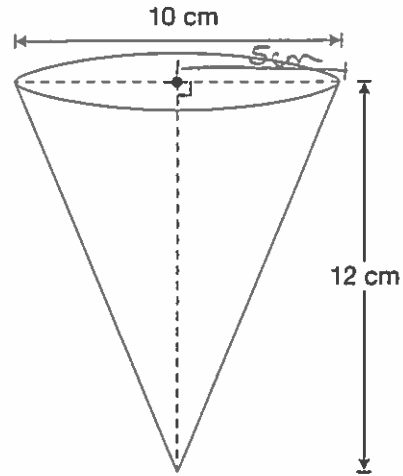$SA = \cancel{2\pi r^2} + \dfrac{2\pi r h}{2}$ ← half cylinder

$= \pi r h$

$= \pi (10)(80)$

$= 2513.3 \text{ m}^2$

$Cost = 2513.3 \text{ m}^2 \times \$3/\text{m}^2$

$= \$7539.82$

21 A cone is pictured below.

10 cm

5 cm

12 cm

Hint:
Use Pythagorean theorem as part of your process.

Which of the following is closest to the surface area of the cone?

a 267 cm²

b 283 cm²

c 691 cm²

d 723 cm²

$s^2 = 5^2 + 12^2$

$s^2 = 25 + 144$

$s^2 = 169$

$s = \sqrt{169}$
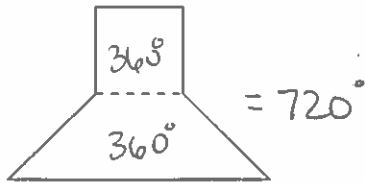
$s = 13$

$SA_{cone} = \pi r s + \pi r^2$
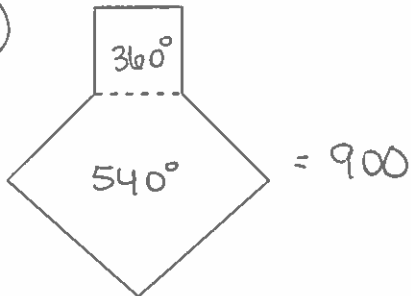
$= \pi(5)(13) + \pi(5)^2$

$= 204.2 + 78.5$

$= 282.7 \text{ cm}^2$

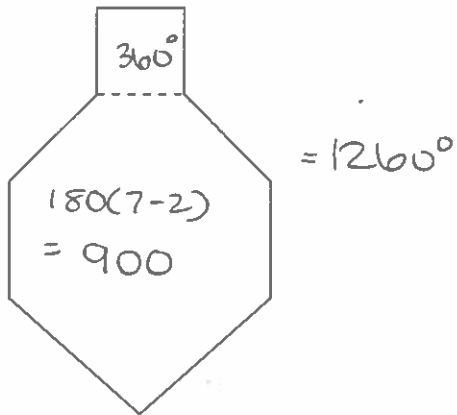**22** Which of the following composite shapes has 900° as the sum of its interior angles?

a

36.8

$= 720°$

$360°$

b

$360°$

$540°$ $= 900$

c

$360°$

$= 1260°$

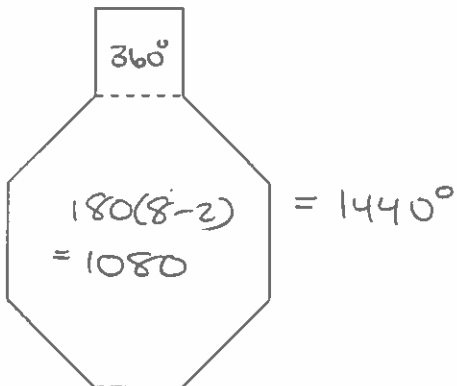$180(7-2)$
$= 900$

d

$360°$

$180(8-2)$ $= 1440°$
$= 1080$

Please read the questions in the *Question Booklet*; then fill in your answers below.

To indicate your answer, **use a pencil to fill in the appropriate circle below completely.**

Like this: ●

Not like this: ⊗ ✓ ◒ ◉

Cleanly erase your answer if you wish to change it and fill in the circle for your new answer.

Fill in only **one** circle for each question.

15 ○ ○ ○ ●

16 ○ ● ○ ○

17 ● ○ ○ ○

18 ○ ○ ● ○

19 ○ ○ ● ○

20 ● ○ ○ ○

21 ○ ● ○ ○

22 ○ ● ○ ○