BRITISH COLUMBIA
Ministry of Education

Applications of Mathematics 12

Examination Booklet
August 2006

Form A

DO NOT OPEN ANY EXAMINATION MATERIALS UNTIL INSTRUCTED TO DO SO.

FOR FURTHER INSTRUCTIONS REFER TO THE RESPONSE BOOKLET.

Contents: 18 pages
44 multiple-choice questions worth 1.5 marks each (maximum of 66 marks)
8 written-response questions (maximum of 24 marks)

Examination: 2 hours
Additional Time Permitted: 60 minutes

PART A: MULTIPLE CHOICE

Value: 66 marks **Suggested Time: 75 minutes**

INSTRUCTIONS: For each question, select the **best** answer and record your choice on the **Answer Sheet** provided. Using an HB pencil, completely fill in the bubble on the **Answer Sheet** that has the letter corresponding to your answer.

You have **Examination Booklet Form A**. In the box above #1 on your **Answer Sheet**, fill in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	●	○	○	○	○	○	○	○

1. Given $P = \begin{bmatrix} 3 & 1 & 2 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 1 & 5 & 1 \end{bmatrix}$, which of the following matrix operations is possible?

   A. PQ

   B. QP

   C. $P + Q$

   D. Q^2

2. Determine $(2M)^2$ if $M = \begin{bmatrix} 1 & -3 \\ 0 & 2 \end{bmatrix}$.

   A. $\begin{bmatrix} 2 & -6 \\ 0 & 4 \end{bmatrix}$

   B. $\begin{bmatrix} 2 & -18 \\ 0 & 8 \end{bmatrix}$

   C. $\begin{bmatrix} 4 & -18 \\ 0 & 16 \end{bmatrix}$

   D. $\begin{bmatrix} 4 & -36 \\ 0 & 16 \end{bmatrix}$

3. Find the element in the 2nd row and 1st column of the following matrix product.

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}\begin{bmatrix} 2 & 3 \\ 3 & -1 \end{bmatrix}$$

A. $2a + 3b$
B. $3a - 1b$
C. $2c + 3d$
D. $3c - 1d$

4. The following matrix, M, gives the price of certain grocery items in three local stores.

$$M = \begin{array}{r} \\ \text{1 L milk} \\ \text{1 dozen eggs} \\ \text{1 loaf of bread} \end{array}\begin{array}{c}\begin{array}{ccc}\text{Q-Foods} & \text{Supermart} & \text{Savemore}\end{array}\\ \begin{bmatrix} \$1.20 & \$1.45 & \$1.02 \\ \$1.45 & \$1.25 & \$1.50 \\ \$1.70 & \$1.55 & \$1.25 \end{bmatrix}\end{array}$$

A family wishes to buy 4 L of milk, 3 dozen eggs and 5 loaves of bread. Which of the following matrix products could be used to calculate the total cost of their purchases at each store?

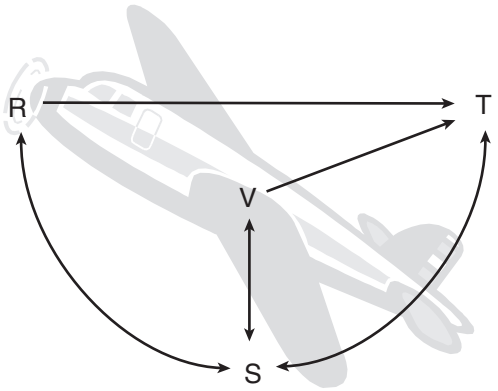
A. $M\begin{bmatrix} 4 & 3 & 5 \end{bmatrix}$

B. $M\begin{bmatrix} 4 \\ 3 \\ 5 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 3 & 5 \end{bmatrix}M$

D. $\begin{bmatrix} 4 \\ 3 \\ 5 \end{bmatrix}M$

5. How many ways can a traveller go from S to T with at most two stopovers?



A. 3
B. 4
C. 5
D. 6

6. A loan is paid monthly and compounded semi-annually for 6 years. Which of the following is true?

	Total Payments	Total Number of Compound Periods
A.	12	2
B.	12	3
C.	72	6
D.	72	12

7. Shares in stocks that track the TSX are purchased for a total of $9000. The TSX index was 6720 when the shares were bought and 6515 when they were sold. What was the profit or loss when they were sold? Answer to the nearest dollar.

A. loss of $275
B. loss of $283
C. profit of $275
D. profit of $283

8. James wants to buy a motorcycle valued at $17 500 by making monthly payments over a 3-year period. If the interest rate is 7.9%, compounded monthly, what is his monthly payment?

   A. $547.58
   B. $567.85
   C. $610.66
   D. $615.64

9. Emily's parents intend to give her $40 000 for her post-secondary education when she turns 18. Approximately how much a month must they set aside for her education over 18 years if interest on the investment is calculated at 3% per annum, compounded monthly?

   A. $108
   B. $140
   C. $185
   D. $240

10. Barrie invested $4000 at a fixed rate of interest per annum, compounded monthly. After 4 years, his investment has grown to $6500. What was the rate at which his money was originally invested?

    A. 12.2%
    B. 12.5%
    C. 12.9%
    D. 15.6%

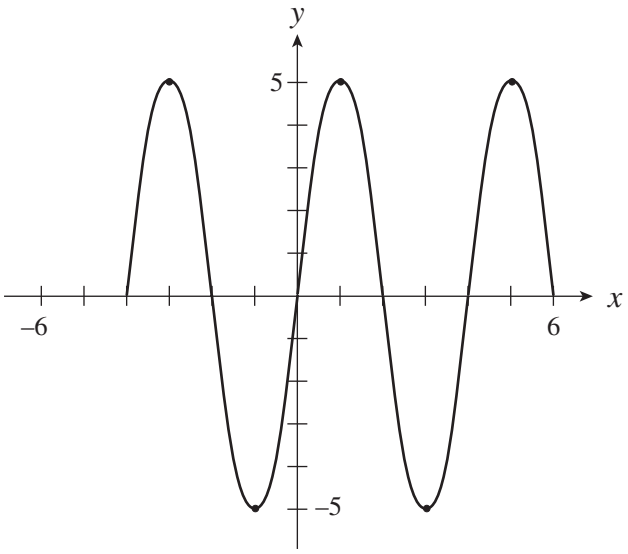
11. The spreadsheet below shows the beginning of the amortization schedule for a loan of $8000 at an interest rate of 6% per annum, compounded monthly, to be paid off in 3 years with 36 equal monthly payments.

	A	B	C	D	E	F
1						
2	Principal	8000.00				
3	Interest rate	0.06				
4	Number of pmnts.	36				
5	Monthly pmnts.	243.38				
6						
7	Payment #	Balance	Monthly	Interest	Payment	Outstanding
8		before	Payment	Payment	to Princ.	Balance
9		Payment $	$	$	$	$
10						8000.00
11	1	8000.00	243.38			
12	2					
13	3					
14	4					
15	5					

Determine the value that should appear in cell D11.

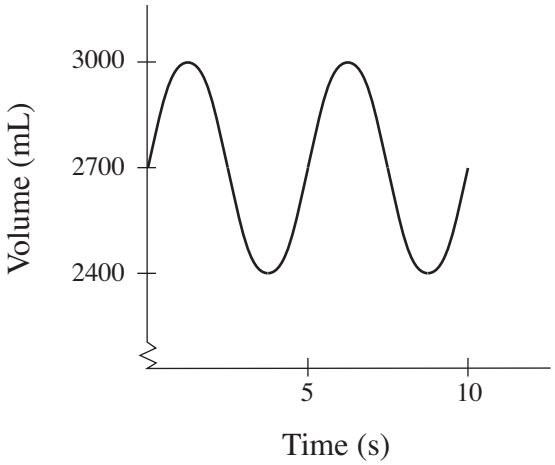
A. $13.33
B. $21.16
C. $40.00
D. $48.00

12. What is the period of the graph in the diagram below?



A. 4
B. 5
C. 6
D. 10

13. The volume of air in a person's lungs is modelled by the sinusoidal function graphed below.



Determine the amplitude of this function.

A. 300 mL
B. 600 mL
C. 2700 mL
D. 3000 mL

14. The height of a piston as it moves up and down in its cylinder is modelled by the equation $h = 25\sin(120t) + 25$ where h is the height in centimetres and t is the time in seconds. What is the piston's height at 10 s?

A. 11.6 cm
B. 22.8 cm
C. 30.2 cm
D. 46.7 cm

15. The function $P = 5000\sin(0.55m - 1.25) + 6500$ approximates the monthly profit in dollars of a bicycle manufacturing plant, where m is the number of months since January 2004. What is the maximum monthly profit made by the plant?

A. $1 500
B. $5 000
C. $6 500
D. $11 500

16. The height of a seat on a Ferris wheel can be modelled by the function $h(t) = 25\sin(0.1571t - 1.2566) + 27$, where t is the time in seconds. If the Ferris wheel starts at $t = 0$, how long will it take the seat to first reach its maximum height?

A. 8 s
B. 10 s
C. 18 s
D. 25 s

17. Selenium decreases in mass 10% per day. What is the approximate half-life of Selenium?

A. between 3 and 4 days
B. between 4 and 5 days
C. between 5 and 6 days
D. between 6 and 7 days

18. A lottery has a prize paid as follows:

Week	1	2	3	4	…	15
Prize	$1	$2	$4	$8	…	**?**

How much money is paid in the 15th week?

A. $4 096
B. $8 192
C. $16 384
D. $32 768

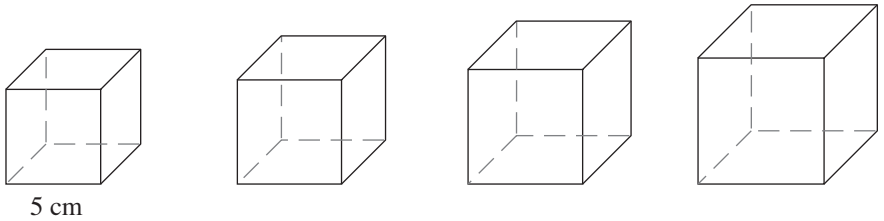
19. The Department of Fisheries and Oceans determines the allowable catch for cod. The table below summarizes the allowable catch for the first 3 years.

Year	Allowable Catch
1	10 000
2	6 000
3	3 600
…	…

If this trend continues, what will be the total allowable catch for the first 5 years?

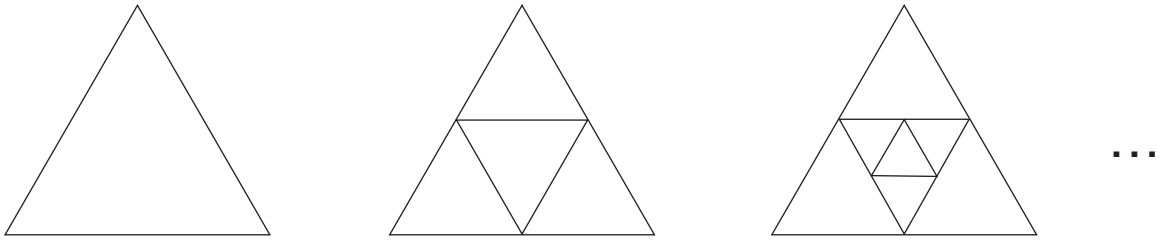
A. 21 760
B. 23 056
C. 23 834
D. 30 000

20. Four candy boxes (cubes) are made so that they can be nested inside each other for easy storage. The smallest box has a side length of 5 cm. For each successive box, the side length is increased by 10%. What is the volume of the largest box? Answer to the nearest cm^3.



A. 221
B. 266
C. 275
D. 295

21. The perimeter of an equilateral triangle is 120 cm. Each new equilateral triangle has sides which are half the length of those in the previous equilateral triangle.

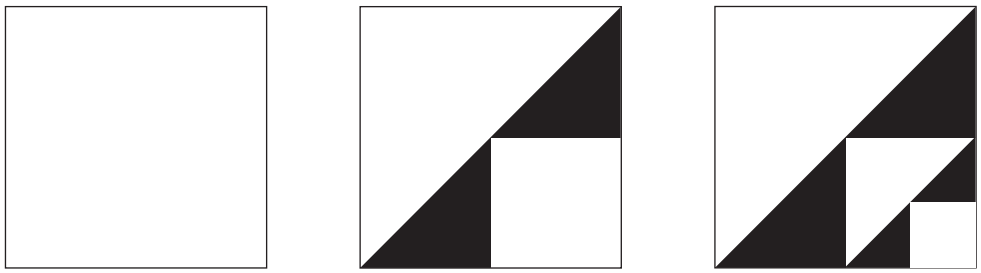


Original Iteration 1 Iteration 2

If this process continues, what is the total perimeter of all equilateral triangles in Iteration 4?

A. 210 cm
B. 225 cm
C. 232.5 cm
D. 236.25 cm

22. The diagram below shows a fractal created from a square. The sides of the original square have length 16 cm.

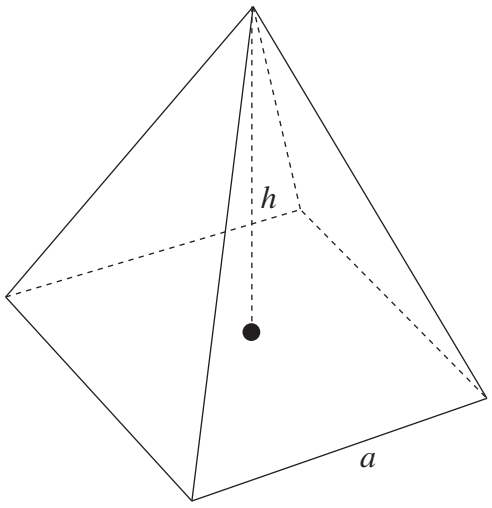


Original Iteration 1 Iteration 2

What is the total area of the white portion of Iteration 3?

A. 171 cm^2
B. 172 cm^2
C. 176 cm^2
D. 192 cm^2

23. Which of the following formulae would be used to determine the volume of the square-based pyramid shown below?



A. $V = \frac{1}{3}ah$

B. $V = \frac{1}{3}a^2h$

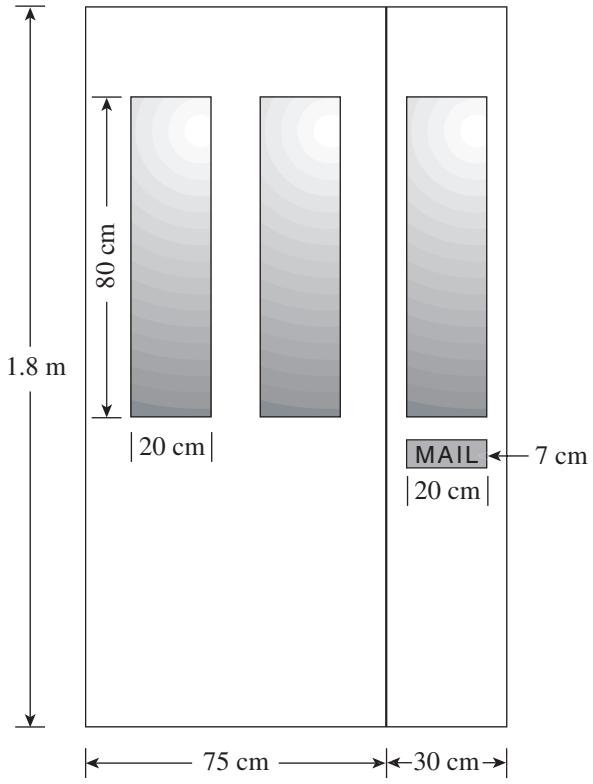
C. $V = \frac{1}{2}a^2h$

D. $V = a^2h$

24. Siding is taken off a rectangular exterior wall measuring 30 m by 1.5 m, and replaced with cultured stone. If the cost of the cultured stone is $\$40/\text{m}^2$, estimate the total cost to redo the wall in stone.

A. $1000
B. $1500
C. $1800
D. $2000

25. A pre-hung exterior door unit has a door and a side panel. The door has two glass windows and the side panel has a window and a mail slot, as shown below. All three windows have the same dimensions.



If the front of the door-and-side-panel unit is to be painted white, what is the area that needs to be painted?

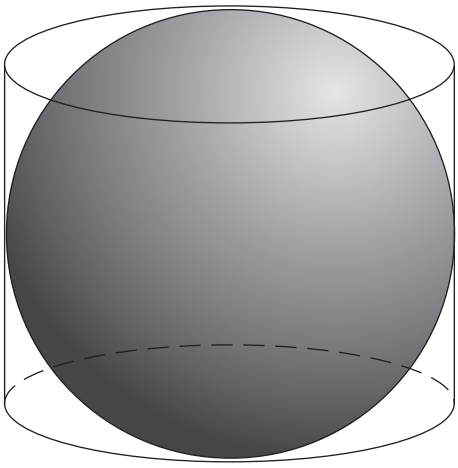
A. 13 960 cm^2

B. 14 100 cm^2

C. 17 160 cm^2

D. 18 900 cm^2

26. A ball with radius 15 cm is tightly packaged into a cylinder as shown below. Determine the volume of the cylinder.



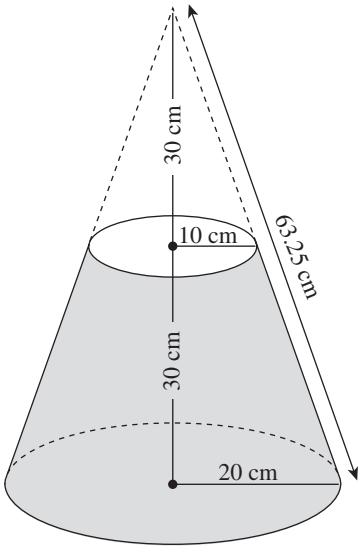
A. 10 603 cm^3

B. 14 137 cm^3

C. 16 135 cm^3

D. 21 206 cm^3

27. How much material is required to make a lampshade that is in the shape of a truncated cone with no top or bottom, as shown below? Answer in cm^2.



A. 1885
B. 2980
C. 3142
D. 4337

28. Which of the following expressions is used to determine the surface area of a solid hemisphere with radius r ?

A. $2\pi r^2$
B. $3\pi r^2$
C. $4\pi r^2$
D. $5\pi r^2$

29. Which of the following is a vector?

A. the speed of a cruise ship
B. the temperature of an engine
C. a distance of 12 km toward the west
D. the mass of a ship travelling due north

30. Vector $\vec{a}$ represents a velocity of 45 km/h [east]. Which of the following vectors represents a velocity of 135 km/h [west]?

A. $-3\vec{a}$
B. $3\vec{a}$
C. $\vec{a}+45$
D. $\vec{a}-90$

31. Concetta runs north for 15 km and turns east and then runs for 12 km. At the end of her run, what heading must Concetta run in order to **get back** to her starting point?

A. $39°$
B. $51°$
C. $219°$
D. $231°$

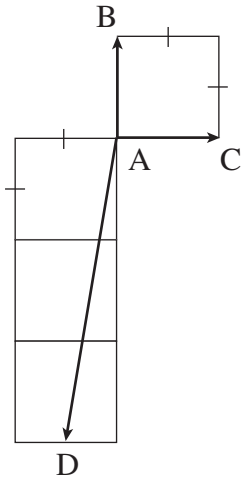
32. Three mutually perpendicular forces are acting on an object.

- one force of 250 N pulls north
- one force of 200 N pulls east
- one force of 150 N pulls straight up

Determine the magnitude of the resultant force on the object. (Answer to the nearest 10 N.)

A. 280 N
B. 350 N
C. 400 N
D. 600 N

33. Which of the following vector equations is a correct representation of $\overrightarrow{AD}$?



A. $\overrightarrow{AD} = 3\overrightarrow{AB} + 2\overrightarrow{AC}$

B. $\overrightarrow{AD} = 3\overrightarrow{AB} + \frac{1}{2}\overrightarrow{AC}$

C. $\overrightarrow{AD} = -3\overrightarrow{AB} + \frac{1}{2}\overrightarrow{AC}$

D. $\overrightarrow{AD} = -3\overrightarrow{AB} - \frac{1}{2}\overrightarrow{AC}$

34. Two 6-sided dice are rolled. What is the probability of rolling doubles?

A. $\frac{1}{3}$

B. $\frac{1}{6}$

C. $\frac{1}{12}$

D. $\frac{1}{36}$

35. A test has 3 multiple-choice questions with 4 possible choices for each question and then 6 true-and-false questions. How many different ways are there to answer the test?

A. 128
B. 144
C. 2916
D. 4096

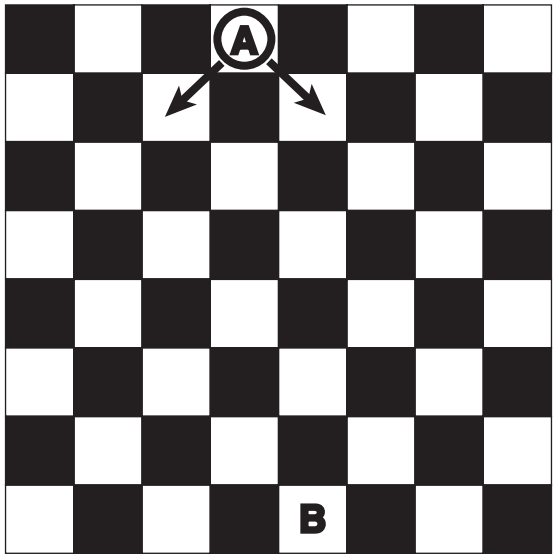
36. The probability that Brad will succeed a free throw in basketball is 78%. What is the probability that he will succeed with exactly 5 free throws out of 9 attempts?

A. 0.0852
B. 0.1144
C. 0.8856
D. 0.9709

37. A card is selected from a standard 52-card deck. What is the probability that the card is red or a face card?

A. 42%
B. 50%
C. 62%
D. 73%

38. A game piece starting at position **A** can travel only diagonally on the white squares, one diagonal square at a time, and only in a downward direction.



If the game piece is randomly moved to the bottom row of the board, what is the probability that it ends at position **B**?

A. 19%
B. 25%
C. 31%
D. 34%

39. Naval signals are made by arranging five coloured flags in a vertical line. The flags are then read from top to bottom. How many different signals can be made using three blue and two green flags?

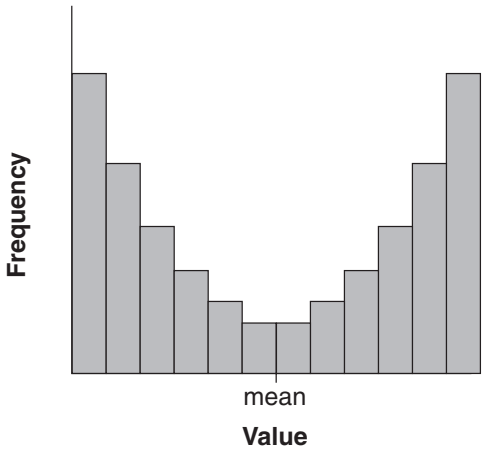
A. 5
B. 6
C. 10
D. 12

40. Standard deviation is the measure of the

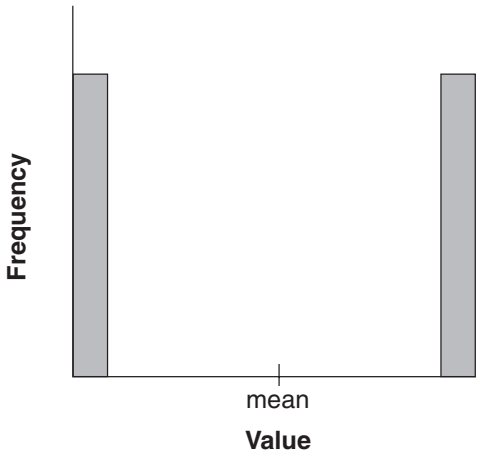
A. *z*-score.
B. probability of an event occurring.
C. area under a standard normal curve.
D. dispersion or spread of scores about the mean.

41. Given that the scales on the following graphs are the same, which of the following frequency distributions has the lowest standard deviation?

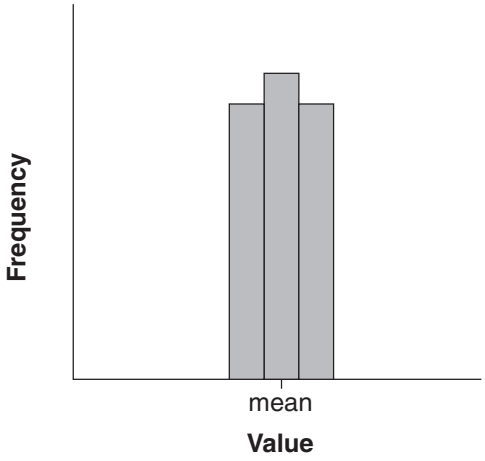
A.



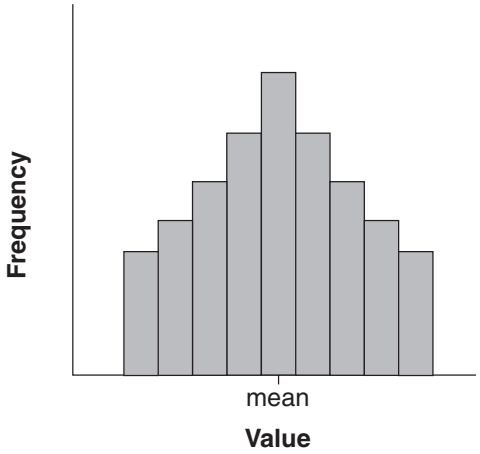
B.



C.



D.



42. Twenty households were surveyed to determine the number of pets in each house. The data is displayed in the table below.

Number of Pets	Frequency
0	2
1	4
2	7
3	5
4	2

Determine the standard deviation of this data.

A. 1.12
B. 1.15
C. 2.05
D. 4.00

43. Elizabeth's marks on four provincial examinations are summarized as follows:

Subject	Score	Mean	Standard Deviation
French	78	61	10
Biology	85	68	15
Chemistry	75	62	13
Mathematics	80	65	12

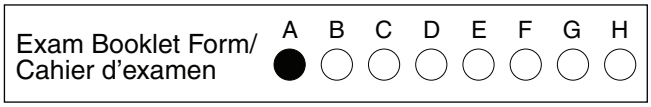
On which test did Elizabeth do best compared to all students who wrote each test?

A. French
B. Biology
C. Chemistry
D. Mathematics

44. An aptitude test for an employment agency has a mean score of 65 with a standard deviation of 6.7. The top 15% of the people tested will be hired. What score must be achieved in order to be hired?

A. 65
B. 72
C. 79
D. 85

You have **Examination Booklet Form A**. In the box above #1 on your **Answer Sheet**, ensure you filled in the bubble as follows.



This is the end of the multiple-choice section.
Answer the remaining questions directly in the Response Booklet.

FORMULAE

Geometry:

Triangle: $\text{Area} = \frac{1}{2}bh$

$= \frac{1}{2}ab\sin C$

Trapezoid: $A = \frac{1}{2}(b_1 + b_2)\cdot h$

Circle: $A = \pi r^2,\ C = 2\pi r = \pi d$

Sphere: $A = 4\pi r^2,\ V = \frac{4}{3}\pi r^3$

Cylinder: $A = 2\pi r^2 + 2\pi rh,\ V = \pi r^2 h$

Cone: $A = \pi rs + \pi r^2,\ V = \frac{1}{3}\pi r^2 h$

Volume of pyramid: $V = \frac{1}{3}A_b h$

Volume of prism: $V = A_b h$

Interest:

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

$I = \text{Pr}\,t$

Miscellaneous:

$a^2 = b^2 + c^2 - 2bc\cos A$

$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Probability and Statistics:

$\mu = \frac{1}{n}\Sigma(f_i)(x_i)$

$\sigma = \sqrt{\frac{1}{n}\Sigma(x_i - \mu)^2}$

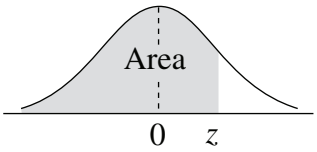
$\mu = np$

$\sigma = \sqrt{np(1-p)}$

$z = \frac{x - \mu}{\sigma}$

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

THE STANDARD NORMAL DISTRIBUTION TABLE



$$F_z(z) = P[Z < z]$$

z	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**
–3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
–3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
–3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
–3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
–3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
–2.9	0.0019	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
–2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
–2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
–2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
–2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
–2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
–2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
–2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
–2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
–2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
–1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
–1.8	0.0359	0.0352	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
–1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
–1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
–1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
–1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0722	0.0708	0.0694	0.0681
–1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
–1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
–1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
–1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
–0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
–0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
–0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
–0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
–0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
–0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
–0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
–0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
–0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
–0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

$$F_z(z) = P[Z < z]$$

z	**0.00**	**0.01**	**0.02**	**0.03**	**0.04**	**0.05**	**0.06**	**0.07**	**0.08**	**0.09**
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9278	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

ROUGH WORK FOR GRAPHING
(No marks will be given for work done on this page.)

ROUGH WORK FOR GRAPHING
(No marks will be given for work done on this page.)

ROUGH WORK FOR MULTIPLE-CHOICE

ROUGH WORK FOR MULTIPLE-CHOICE

ROUGH WORK FOR MULTIPLE-CHOICE

MINISTRY USE ONLY

MINISTRY USE ONLY

Question 1					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 2					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 3					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 4					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 5					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 6					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 7					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐
Question 8					
0	1	2	3	(.5)	NR
☐	☐	☐	☐	☐	☐

Place Personal Education Number (PEN) here.

Course Code = AMA 12

AUGUST 2006

Exam Booklet Form/ Cahier d'examen A ○ B ○ C ○ D ○ E ○ F ○ G ○ H ○

Student Instructions

1. Place your Personal Education Number (PEN) label at the top of this Booklet **AND** fill in the bubble (Form A, B, C, D, E, F, G or H) that corresponds to the letter on your Examination Booklet.
2. Use a pencil to fill in bubbles when answering questions on your Answer Sheet.
3. When using a calculator:
   - in a justification, clearly present the information in the response (e.g., if a graph is used in the solution of the problem, sketch the graph showing the general shape and indicate the appropriate window dimensions).
   - round final answers with decimals to at least two decimal places unless otherwise indicated in the question.
4. Read the Examination Rules on the back of this Booklet.

MINISTRY USE ONLY

Place Personal Education Number (PEN) here.

Course Code = AMA 12

Applications of Mathematics 12

AUGUST 2006

Response Booklet

BRITISH COLUMBIA
Ministry of Education

PART B: WRITTEN RESPONSE

Value: 24 marks **Suggested Time: 45 minutes**

INSTRUCTIONS: Answer **all parts** of the following questions in the space provided in the **Response Booklet**.

Rough-work space has been incorporated into the space allowed for answering each question. You may not need all the space provided to answer each question.

If, in a justification, you refer to information produced by the calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem, it is important to sketch the graph, showing its general shape and indicating the appropriate window dimensions.

When using the calculator, you should provide a decimal answer that is correct to **at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

Full marks will NOT be given for the final answer only.

1. In a survey of diet cola drinkers, 60% drank Brand A while 40% drank Brand B. Market research shows that each month:

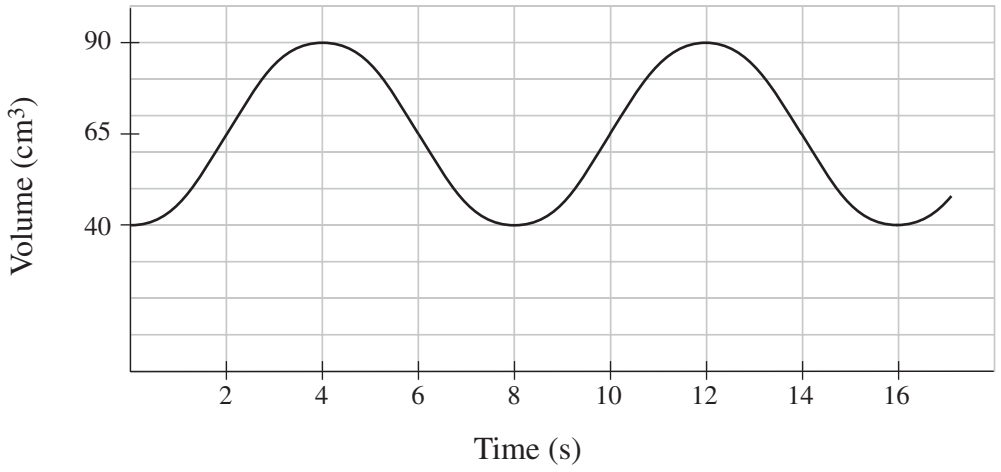
   - 10% of Brand A drinkers switch to Brand B
   - 35% of Brand B drinkers switch to Brand A

   Determine what percentage of diet cola drinkers will be drinking Brand B after 3 months; **and then**, if the pattern continues, determine what the final market share will be for Brand B in the longer term. **(3 marks)**

2. Hilary deposits $200 at the beginning of every month into an RRSP account paying $8\frac{1}{2}\%$ per annum compounded monthly. She deposits the money regularly for 25 years.

Determine what the balance in Hilary's RRSP account will be after 25 years; **and then**, determine by how much her account grew from the end of the 24th year to the end of the 25th year. **(3 marks)**

3. The sinusoidal graph below represents the volume, V, of air remaining in a cylinder as a piston moves up and down over time, t.

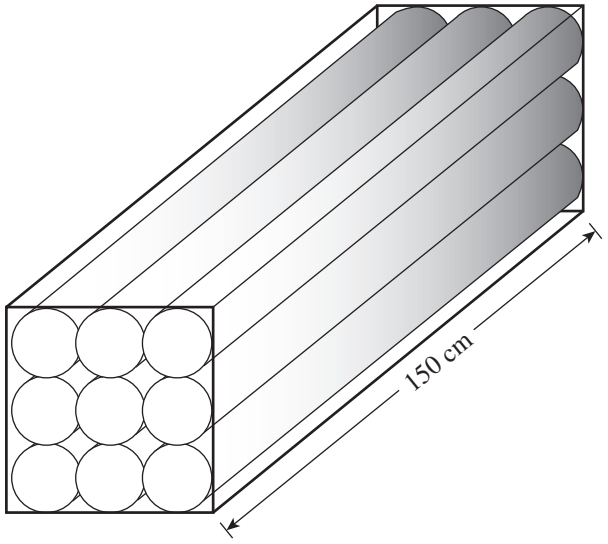


Using the sine regression equation, determine the amount of time during each period the volume is greater than $60\ cm^3$. **(3 marks)**

4. A certain prescription drug calls for a first dosage of 400 mg and then a dosage of 50 mg on each successive day. The body eliminates 65% of the medication from the bloodstream every day.

   Determine the number of milligrams of medication in the bloodstream immediately before the 5^{th} dosage **and** the maintenance level of this drug. **(3 marks)**

5. A company orders 30 boxes of fluorescent light bulbs that are pre-packaged in cardboard rectangular boxes with closed ends containing 9 light bulbs each, as shown in the diagram below.



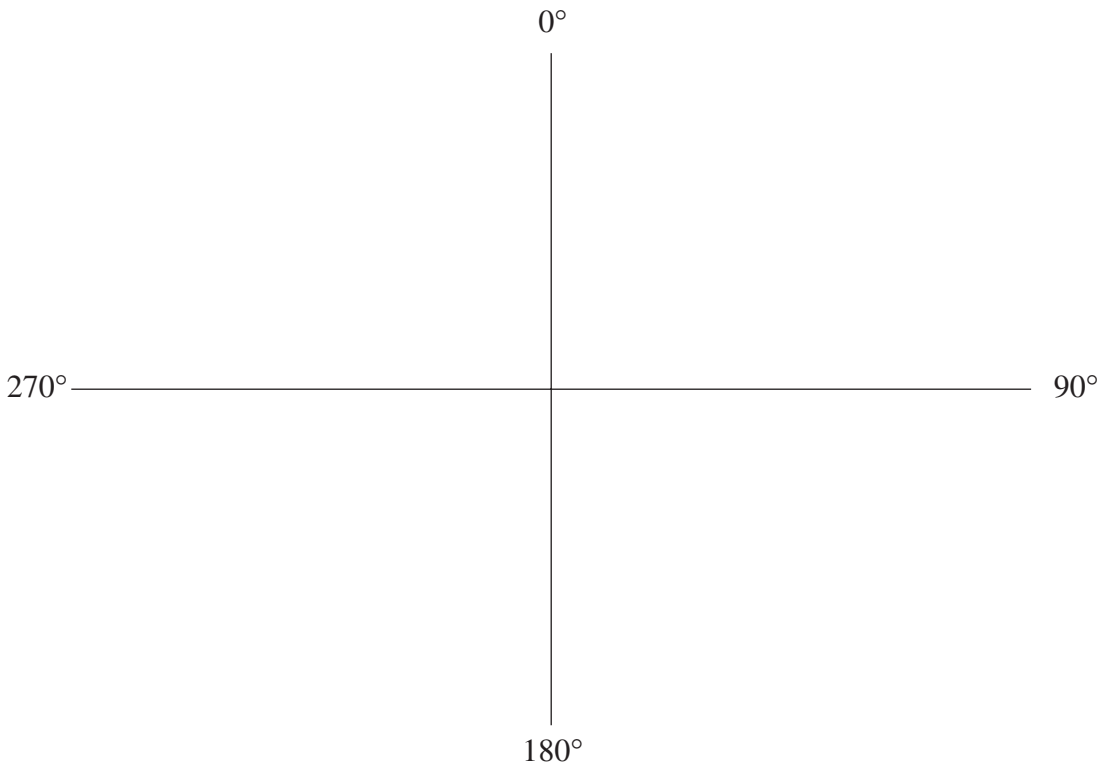
- Each light bulb has a diameter of 3 cm and a length of 150 cm.
- Each light bulb costs $2.50.
- Cardboard costs $\$0.0002/\text{cm}^2$.

What is the total cost of the 30 boxes of light bulbs and the cardboard packaging?

(3 marks)

6. Two ropes are attached to a tree. A boy pulls on one of the ropes exerting a force of 400 N toward 110°. A man pulls on the second rope with a force of 650 N toward 080°.

   Determine the magnitude and the direction of the resultant force vector. Show your vector diagram below. **(3 marks)**



7. In a coastal region of British Columbia, the probability that it will rain on any given day in January is 0.3.

   Determine the probability it will rain at least 12 days out of the 31 days in January.

   (3 marks)

8. Acme Co. manufactures balls. The diameters of these balls are normally distributed with a mean of 5 cm and a standard deviation of 0.2. Balls with diameters less than 4.77 cm and greater than 5.35 cm are rejected.

   In a production run of 1000 balls, how many balls will be rejected? **(3 marks)**

END OF EXAMINATION

Examination Rules

1. The time allotted for this examination is two hours.
   You may, however, take up to 60 minutes of additional time to finish.
2. Answers entered in the Examination Booklet will not be marked.
3. Cheating on an examination will result in a mark of zero. The Ministry of Education considers cheating to have occurred if a student breaks any of the following rules:

   - Candidates must not give or receive assistance of any kind in answering an examination question during an examination, including allowing one's paper to be viewed by others or copying answers from another student's paper.
   - Candidates must not possess any book, paper or item that might assist in writing an examination, including a dictionary or piece of electronic equipment, that is not specifically authorized for the examination by ministry policy.
   - Candidates must immediately follow the invigilator's order to stop writing at the end of the examination time and must not alter an Examination Booklet, Response Booklet or Answer Sheet after the invigilator has asked students to hand in examination papers.
   - Candidates must not communicate with another student during the examination.
   - Candidates must not remove any piece of the examination materials from the examination room, including work pages.
   - Candidates must not take or knowingly use any secure examination materials prior to the examination session.

4. The use of inappropriate language or content may result in a mark of zero being awarded.
5. Upon completion of the examination, return all examination materials to the supervising invigilator.