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<b>MARK SCHEME</b>	<b>نموذج الإجابة وتوزيع الدرجات</b>
<b>KINGDOM OF BAHRAIN</b>	<b>مملكة البحرين</b>
<b>EDUCATION &amp; TRAINING QUALITY AUTHORITY</b>	<b>هيئة جودة التعليم والتدريب</b>
Directorate of National Examinations	إدارة الامتحانات الوطنية
Grade 12 National Examinations	الامتحانات الوطنية للصف الثاني عشر
<b>March 2017</b>	<b>مارس 2017</b>
<b>PROBLEM SOLVING</b>	<b>حل المشكلات</b>
<b>Paper 1 Problem Solving</b>	<b>الورقة 1 حل المشكلات</b>

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the National Examinations. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at the Examiners' meeting before marking began. All Examiners are instructed that alternative correct answers and unexpected approaches in students' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated, even if they do not appear in this mark scheme. Therefore, the Directorate of National Examinations, BQA will not enter into discussions or correspondence in connection with these mark schemes.

Mark schemes must be read in conjunction with the question papers and the Principal Examiner reports.

<b>1</b>	<b>Key</b>	<b>B</b>	His sister stayed 3 hours at the mall. Raed needs 45 minutes to get back home. So Raed stayed at home for 2 hours and 15 minutes (3 hours - 45 minutes).
	<b>Distractors</b>		
	<b>A</b>	Subtracting the time needed for the round trip from the time his sister spent at the mall.	
	<b>C</b>	The time his sister spent at the mall without taking into consideration the time Raed needs to get back home.	
	<b>D</b>	Time elapsed since he left home until he received the phone call.	
<b>2</b>	<b>Key</b>	<b>D</b>	Represents the mean temperatures correctly.
	<b>Distractors</b>		
	<b>A</b>	The bars for 2000 and 2002 are the wrong way round, and also the bars for 2004 and 2008.	
	<b>B</b>	The bars for 2004 and 2008 are the wrong way round.	
	<b>C</b>	The bars for 2002 and 2008 are the wrong way round.	
<b>3</b>	<b>Key</b>	<b>B</b>	The remaining amount is 200 fils. Gifts' total cost = $18.100 + 16.400 + 15.300 = 49.800$
	<b>Distractors</b>		
	<b>A</b>	They need an additional BD 2 to buy these gifts. Gifts' total cost = $18.100 + 16.400 + 17.500 = 52.000$	
	<b>C</b>	They need an additional 900 fils to buy these gifts. Gifts' total cost = $18.100 + 17.500 + 15.300 = 50.900$	
	<b>D</b>	The remaining amount is 800 fils. Gifts' total cost = $16.400 + 17.500 + 15.300 = 49.200$	

<b>4</b>	<b>Key</b>	<b>B</b>	The correct perspective which fulfils all the data.
	<b>Distractors</b>		
	<b>A</b>	The perspective from the left.	
	<b>C</b>	The perspective from in front.	
	<b>D</b>	The perspective from behind.	
<b>5</b>	<b>Key</b>	<b>C</b>	<p>The number of absent employees on Sunday and Thursday is 8 times the number of absent employees on Tuesday.</p> <p>The number of absent employees on Monday is 4 times the number of absent employees on Tuesday.</p> <p>The number of absent employees on Wednesday is twice the number of absent employees on Tuesday.</p>
	<b>Distractors</b>		
	<b>A</b>	See above.	
	<b>B</b>	See above.	
	<b>D</b>	See above.	
<b>6</b>	<b>Key</b>	<b>D</b>	<p>Hamza Rashid and Usman Tariq are over 40 years. Ahmed Salman and Mohammad Yusuf have less than or equal to 3 years of experience. Shahid Khan has greater than 5 accidents.</p> <p>So, 5 candidates will not be short-listed for the interview.</p>
	<b>Distractors</b>		
	<b>A</b>	This excludes the candidates who are more than 40 years of age.	
	<b>B</b>	This is the number of the short-listed candidates.	
	<b>C</b>	This includes the candidate who has 3 years' experience to the 3 short-listed candidates.	

<b>7</b>	<b>Key</b>	<b>C</b>	<p>Second semester marks average =  <math>(74 + 70 + 78 + 78) \div 4 = 75</math>  Therefore, the first semester marks average =  <math>75 + 5 = 80</math>  Total marks of the first semester =  <math>80 \times 4 = 320</math>  Which means total marks in science and  mathematics = <math>320 - (79 + 75) = 166</math>  Twice science mark = <math>166 - 6 = 160</math>  Then, science mark = 80</p>
	<b>Distractors</b>		
	<b>A</b>	The student assumed that the marks average at the end of the second semester has increased by 5 marks more than the marks average at the end of the first semester, instead of decreasing.	
	<b>B</b>	The student assumed that the marks average at the end of the second semester has remained the same as the marks average at the end of the first semester.	
	<b>D</b>	The student assumed that Khalid's mark in science has decreased by 5 marks.	
<b>8</b>	<b>Key</b>	<b>D</b>	In October, he owed \$50. Since in November his balance became \$90, so he has deposited \$140.
	<b>Distractors</b>		
	<b>A</b>	Student thinks that Ahmed has \$70 in September and he owed \$50 in October, so the balance is \$20. Thus, to get \$90 in November he deposited \$70.	
	<b>B</b>	\$90 represent the balance for the month of November in the graph.	
	<b>C</b>	Student thinks that Ahmed has \$70 in September, he owed \$50 in October, and he has \$90 in November. Thus $\$70 - \$50 + \$90 = \$110$ .	

<b>9</b>	<b>Key</b>	<b>C</b>	The mark in physics is half the mark in history, the mark in Arabic is half the mark in mathematics, and the mark in English is a little bit lower than the mark in history, which corresponds to the bar heights in the chart.
	<b>Distractors</b>		
	<b>A</b>	This would be the correct option only if the mark in Arabic was half the mark in mathematics.	
	<b>B</b>	This would be the correct option only if the marks in mathematics and Arabic were higher.	
	<b>D</b>	This would be the correct option only if the mark in English was a little bit lower than the mark in history.	
<b>10</b>	<b>Key</b>	<b>D</b>	Given that the basement is 10 m high, each of the next 3 storeys is 4.4 m and each of the next 3 storeys is 4 m high, the height of the floor of the sixth storey will be $10 + 3 \times 4.4 + 3 \times 4 = 35.2$ m above the floor of the basement.
	<b>Distractors</b>		
	<b>A</b>	The student assumed that the height of each of the next 3 storeys increases by 0.4 m $10 + 3 \times 2 + 3 \times 2.4 = 23.2$	
	<b>B</b>	The student did not add 10 m (basement height) $3 \times 4.4 + 3 \times 4 = 25.2$	
	<b>C</b>	The student started calculating height from the top $10 + 2 \times 4.4 + 3 \times 4 + 1 \times 3.6 = 34.4$	
<b>11</b>	<b>Key</b>	<b>C</b>	This chart represents the changes in percentages of the second semester of the academic year 2015/2016 in mathematics. Whereas the percentage of students who achieved good is 25% and the percentage of students who failed is less than the percentage of students who achieved good.
	<b>Distractors</b>		
	<b>A</b>	This chart represents the percentage of failed students to be equal to that who achieved good; whereas the percentage of failed students should be less.	
	<b>B</b>	This chart represents the percentages of the second semester of the academic year 2014/2015 in mathematics.	
	<b>D</b>	In this chart, if the percentage of students who achieved good is 25%, the total of percentages will add up to more than 100%.	

<b>12</b>	<b>Key</b>	<b>D</b>	The amount of money remaining with Shaima: $330 - 120 \times 80\% - 165 + 25 = \text{BD } 94$ She can buy small-sized top loading or medium-sized twin tub or small-sized twin tub and to spend as much as possible of the remaining money with her, she will choose the small-sized top loading washing machine.
	<b>Distractors</b>		
	<b>A</b>		Calculating the discounted price of the TV incorrectly. $330 - 120 \times 20\% - 165 + 25 = \text{BD } 166$
	<b>B</b>		Not taking into account the BD 25 reduction on the refrigerator. $330 - 120 \times 80\% - 165 = \text{BD } 69$
	<b>C</b>		The student overlooks the need to choose the washing machine that Shaima will spend as much as possible of the remaining money with her.
<b>13</b>	<b>Key</b>	<b>C</b>	The number of coins is 85 and the total amount is BD 4 and the difference between the number of 100 fils coins and the number of 50 fils coins is 5.
	<b>Distractors</b>		
	<b>A</b>		The number of coins is correct but the total amount is BD 5.
	<b>B</b>		The number of coins is correct and the total amount is correct, but the difference between the number of 100 fils coins and the number of 50 fils coins is 9.
	<b>D</b>		The total amount is correct, but the number of coins is 65 only
<b>14</b>	<b>Key</b>	<b>B</b>	This is the only shape Yousif will get.
	<b>Distractors</b>		
	<b>A</b>		Following the folding steps correctly but cutting off the bottom-right corner.
	<b>C</b>		Following the folding steps correctly but cutting off the top-right corner.
	<b>D</b>		Following the folding steps correctly but cutting off the top-left corner.

<b>15</b>	<b>Key</b>	<b>A</b>	<p>From Jeddah to Dubai it takes 3 hours 40 minutes, so it arrives to Dubai at 04:40 with Itinerary I. From Dubai to Colombo it takes 5 hours 45 minutes, so it departs from Dubai at 19:10 with Itinerary K.</p> <p>Therefore:</p> <p>Itinerary I waiting time in Dubai is 3 hours 5 minutes.            Itinerary J waiting time in Dubai is 3 hours 20 minutes.            Itinerary K waiting time in Dubai is 3 hours 35 minutes.            Itinerary L waiting time in Dubai is 3 hours 30 minutes.</p>
	<b>Distractors</b>		
	<b>B</b>	See above.	
	<b>C</b>	See above.	
	<b>D</b>	See above.	
<b>16</b>	<b>Key</b>	<b>C</b>	<p>Price of 2 packs of 2 trousers, 3 packs of 5 ties and a jacket is <math>2 \times 20 + 3 \times 5 + 1 \times 22 = \text{BD } 77</math></p> <p>Number of pieces:  <math>4 + 15 + 1 = 20</math></p>
	<b>Distractors</b>		
	<b>A</b>	Options A, B and D satisfy either the correct paid amount but the wrong number of pieces or the correct number of pieces but the wrong paid amount or does not satisfy neither conditions.	
	<b>B</b>	See above.	
	<b>D</b>	See above.	

<b>17</b>	<b>Key</b>	<b>B</b>	The average cost per day should be decreasing while the days of the program are increasing and will not reach zero by the fifth day.
	<b>Distractors</b>		
	<b>A</b>	The student considers the cost of each day.	
	<b>C</b>	The student calculates the average cost, but the average cost for the fifth day should be more than BD 2.	
	<b>D</b>	The student thinks that the second and the third days have the same average cost.	
<b>18</b>	<b>Key</b>	<b>B</b>	The total amount collected at the end of break period from selling egg and chicken burger sandwiches is BD 4. Assuming that 21 sandwiches remain in the refrigerator, 7 of which are cheese sandwiches because 7 cheese sandwiches were sold. Therefore, the number of remaining sandwiches is 11 egg sandwiches and 3 chicken burger sandwiches.
	<b>Distractors</b>		
	<b>A</b>	The student can get this piece of information from the question.	
	<b>C</b>	The student can get this piece of information from the question.	
	<b>D</b>	The student can get this piece of information from the question.	
<b>19</b>	<b>Key</b>	<b>B</b>	Total profit from the remaining quantity of fish (BD 54.950): $33 \times 0.500 + 27 \times 0.750 + 14 \times 1.300$
	<b>Distractors</b>		
	<b>A</b>	Using the discounted price: $33 \times 0.500 + 27 \times 0.350 + 14 \times 0.700$	
	<b>C</b>	Calculating the total profit from selling the total quantity of fish (ignoring the indicated time period): $40 \times (1.000 + 0.500) + 30 \times (1.100 + 0.750) + 15 \times (2.000 + 1.300)$	
	<b>D</b>	Calculating the revenue from the remaining quantity of fish: $33 \times 2.500 + 27 \times 3.150 + 14 \times 6.300$	

<b>20</b>	<b>Key</b>	<b>B</b>	4 chefs made 24 large cakes in 3 hours ( $4 \times 3 \times 2 = 24$ ) 7 chefs made 735 cupcakes in 3 hours ( $7 \times 3 \times 35 = 735$ ) 1 chef made 2 large cakes in the first hour and 70 ( $35 \times 2$ ) cupcakes in the second and third hours. Therefore, Waseem hired 12 ( $4 + 7 + 1$ ) chefs to prepare 26 large cakes and 805 cupcakes.
	<b>Distractors</b>		
	<b>A</b>	The student forgot to count the chef who made both kinds of cakes.	
	<b>C</b>	The student thinks that he needs 5 chefs to make 26 large cakes, and 8 chefs to make 800 cupcakes.	
	<b>D</b>	The student ignores the kitchen availability hours (3 hours). 13 chefs to make the large cakes ( $26 \div 2 = 13$ ) and 23 chefs to make the cupcakes ( $805 \div 35 = 23$ )	
<b>21</b>	<b>Key</b>	<b>C</b>	Ahmad's car can travel almost 314 km ( $110 \div 28 \times 80$ ) with a full tank. Since gas stations are located every 25 km, then he has to stop and fill the gas tank every 300 km. Therefore, the least number of gas stations is 7 ( $2350 \div 300 = 7.83$ ) as he started with a full tank.
	<b>Distractors</b>		
	<b>A</b>	Considering fuel consumption to be 20 litres per 80 km instead of 28 litres per 80 km.	
	<b>B</b>	Considering fuel consumption to be 20 litres per 80 km instead of 28 litres per 80 km and including the first gas station which Ahmad stopped at.	
	<b>D</b>	Including the first gas station which Ahmad stopped at.	

<b>22</b>	<b>Key</b>	<b>D</b>	$350 \times 0.010 + 75 \times 0.020 + 5 = \text{BD } 10$
	<b>Distractors</b>		
	<b>A</b>	The student ignored the monthly fee (BD 5) $350 \times 0.020 + 75 \times 0.040 = \text{BD } 10$	
	<b>B</b>	The student subtracted the 200 free minutes from 625, but forgot to subtract the 75 minutes to other carriers $425 \times 0.010 + 75 \times 0.010 + 5 = \text{BD } 10$	
	<b>C</b>	The student ignored the free local minutes (200) $550 \times 0.005 + 75 \times 0.030 + 5 = \text{BD } 10$	
<b>23</b>	<b>Key</b>	<b>A</b>	Since it rained for 13 days and we have one clear afternoon more than clear mornings, so it rains 7 days in the morning and 6 days in the afternoon. Therefore, we have 7 clear afternoons and we need 12 clear afternoons. Also, we have 6 clear mornings and we need 11 clear mornings. Thus, 5 clear days are needed. Hence, 7 days rainy morning + 6 days rainy afternoon + 5 clear days = 18 days.
	<b>Distractors</b>		
	<b>B</b>	Total of (clear mornings + clear afternoons).	
	<b>C</b>	Total of (clear mornings + one clear day + clear afternoons).	
	<b>D</b>	Total of (clear mornings + clear afternoons + rainy days).	
<b>24</b>	<b>Key</b>	<b>B</b>	The remaining parking space after the park of 40 small cars is $521 - (7 \times 40) = 241 \text{ m}^2$ A systematic research will reveal a unique solution, which is 5 mid-size cars and 7 buses $(16 \times 5 + 23 \times 7 = 241)$
	<b>Distractors</b>		
	<b>A</b>	Not using the whole parking space; $9 \text{ m}^2$ will remain. Assuming that 3 mid-size cars and 8 buses park $(16 \times 3 + 23 \times 8 = 232)$ .	
	<b>C</b>	Additional $2 \text{ m}^2$ are needed. Assuming that 8 mid-size cars and 5 buses park $(16 \times 8 + 23 \times 5 = 243)$	
	<b>D</b>	Forgetting to subtract the parking space occupied by the 40 small cars. Therefore, student will get 11 mid-size cars and 15 buses. $(16 \times 11 + 23 \times 15 = 521)$	

<b>25</b>	<b>Key</b>	<b>C</b>	<p>For delivering the first parcel Ibrahim consumed <math>12 \div 4 = 3</math> litres, so <math>12 - 3 = 9</math> litres left.</p> <p>For delivering the second and third parcels he consumed <math>9 \div 2 = 4.5</math> litres, so <math>9 - 4.5 = 4.5</math> litres left.</p> <p>He needed <math>(2 \div 3) \times 4.5 + 4.5 = 7.5</math> litres.</p> <p>Total fuel needed to deliver 5 parcels was 15 <math>(3 + 4.5 + 7.5)</math> litres.</p> <p>Then, the total distance he traveled = <math>15 \times 45 \div 3 = 225</math> km.</p>
	<b>Distractors</b>		
	<b>A</b>	Not calculating the extra fuel needed.	
	<b>B</b>	Considering the fuel consumed to deliver the second and third parcels as half the tank capacity.	
	<b>D</b>	<p>Forgetting to add the fuel consumed to deliver the second and third parcels.</p> <p>Total fuel needed was 18 <math>(3 + 9 + (2 \div 3) \times 9)</math> litres.</p>	
<b>26</b>	<b>Key</b>	<b>A</b>	<p>Since 10 males wore brown shoes, then 9 females wore brown shoes and since 8 females wore black shoes, then in total there are 7 females who wore white shoes.</p> <p>Since 5 females wore skirts and white shoes, then only 2 girls will be there who wore trousers and white shoes. Since Mariam is one of them, only one more girl will be there.</p>
	<b>Distractors</b>		
	<b>B</b>	Counting the total including Mariam.	
	<b>C</b>	1 other female + 6 males were wearing trousers and white shoes.	
	<b>D</b>	2 females (including Mariam) + 6 males were wearing trousers and white shoes.	

<b>27</b>	<b>Key</b>	<b>D</b>	This chart corresponds to the given data. Fail rates in the two academic years 2012/2013 and 2013/2014 are respectively as follows: 25% and 15% in Al-Ethad, 10% and 20% in Al-Huda, 20% and less than 5% in Al-Abtal, 5% and 5% in Al-Amal, 15% and more than 20% in Al-Shurooq.
	<b>Distractors</b>		
	<b>A</b>	This chart represents pass rates in 2012/2013 and 2013/2014.	
	<b>B</b>	All the rates are correct, except for Al-Huda's fail rate in 2013/2014 which should have been double the fail rate in 2012/2013.	
	<b>C</b>	All the rates are correct, except for Al-Shurooq's fail rate in 2013/2014 which is less than Al-Huda's fail rate.	
<b>28</b>	<b>Key</b>	<b>A</b>	Rashid ordered one of each of the four offers which cost BD 10, as well as two additional cups of juice and two additional large salads for BD 3.400. If Rashid pays BD 1.350 as service charge, the total amount he paid will be BD 14.750.
	<b>Distractors</b>		
	<b>B</b>	The student forgets that the restaurant will add the price of the additional two cups of juice.	
	<b>C</b>	The student forgets that the restaurant will add the price of the additional two large salads.	
	<b>D</b>	The student forgets that the restaurant will add the price of the additional two cups of juice and two large salads.	

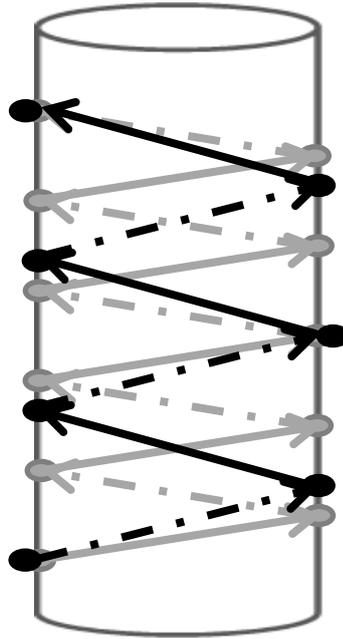
<b>29</b>	<b>Key</b>	<b>B</b>	<p>If the number of Sameer's team's wins and the number of Sameera's team's draws with goals is 5, then the matches distribution table is as follows:</p> <table border="1"> <thead> <tr> <th>Wins</th> <th>Draws with goals</th> <th>Total points</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>5</td> <td>10</td> </tr> <tr> <td>1</td> <td>4</td> <td>11</td> </tr> <tr> <td>2</td> <td>3</td> <td>12</td> </tr> <tr> <td>3</td> <td>2</td> <td>13</td> </tr> <tr> <td>4</td> <td>1</td> <td>14</td> </tr> <tr> <td>5</td> <td>0</td> <td>15</td> </tr> </tbody> </table> <p>Since Sameer's team got 10 points at the end of the tournament, the team played 5 matches, all ending in a draw with goals. Therefore, the number of participating teams is 6, which means we can find the exact number of participating teams.</p>	Wins	Draws with goals	Total points	0	5	10	1	4	11	2	3	12	3	2	13	4	1	14	5	0	15
			Wins	Draws with goals	Total points																			
			0	5	10																			
			1	4	11																			
			2	3	12																			
3	2	13																						
4	1	14																						
5	0	15																						
<b>Distractors</b>																								
<b>A</b>	This allows for more than one solution for the number of matches Sameer's team played: 4, 5 or 6, which means we cannot find the exact number of participating teams.																							
<b>C</b>	This allows for more than one solution for the number of matches Sameer's team played: 5 or 7, which means we cannot find the exact number of participating teams.																							
<b>D</b>	This allows for more than one solution for the number of matches Sameer's team played: 4, 7 or 10, which means we cannot find the exact number of participating teams.																							

30

Key

B

7 crossings are shown in the picture below.



**Distractors**

**A**

As 3 twists is made by the tea rose altogether 6 times they cross.

**C**

7 times + 1 time crossing shown in the graph, but in real case one creeper rotating in the front and the other creeper rotating in the back.

**D**

7 times + 2 times (bottom and first branch).