

<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>Mathematical Skills</b>	<b>امتحان المهارات الرياضية</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 for awarding marks.

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

1	<b>Key</b>	<b>D</b>	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. So, 5 candidates will not be short-listed for the interview
	<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.	
2	<b>Key</b>	<b>B</b>	This is the correct representation.
	<b>Distractors</b>		
	<b>A</b>	The first bar was replaced with the fifth bar.	
	<b>C</b>	The difference between any score and the following less score exceeds 2.	
3	<b>Key</b>	<b>C</b>	For the package sent to Kuwait, the rate of the first 0.5 kg is BD 4.5, and the cost of shipping the additional 2 kg is BD 4. Therefore, the cost of shipping the package to Kuwait is BD 8.5.
			As for the package sent to India, the rate of the first 0.5 kg is BD 5, and the cost of shipping the additional 2.5 kg is BD 10. Therefore, the cost of shipping the package to India is BD 15.  The total cost is $8.5 + 15 = \text{BD } 23.5$ .
	<b>Distractors</b>		
	<b>A</b>	$4.5 + 5 = \text{BD } 9.5$ Only the first 0.5 kg has been considered for both packages.	
	<b>B</b>	$4.5 + 1 + 5 + 2 = \text{BD } 12.5$ Only one additional 0.5 kg has been considered for both packages.	
<b>D</b>	$4.5 + 5 + 5 + 12 = \text{BD } 26.5$ An additional 2.5 kg for Kuwait and an additional 3 kg for India have been considered.		

4	Key	D	Rashid pressed 1 key 9 times (1 – 9), 2 keys 90 times (10 – 99), 3 keys 1 time (100) and the space key 99 times. Therefore, he will press the keyboard keys $9 + 180 + 3 + 99 = 291$ times.
	<b>Distractors</b>		
	A	The student forgot to count spaces.	
	B	The student thinks that Rashid had pressed the keys twice for the first 9 numbers.	
	C	The student forgot to include the number 100.	
5	Key	B	The best solution is to buy 1 box of 15 bottles, 3 boxes of 9 bottles and 2 boxes of 4 bottles.
	<b>Distractors</b>		
	A	There is no way to do it with 5 boxes.	
	C	This is 2 boxes of 15 bottles and 5 boxes of 4 bottles.	
	D	This is 2 boxes of 9 bottles and 8 boxes of 4 bottles.	
6	Key	D	Mariam travels 75 minutes with a speed of 80 kilometres per hour or faster.  $\frac{75}{150} \times 100 = 50\%$
	<b>Distractors</b>		
	A	The student has only considered the time for which Mariam was travelling at 80 kilometres per hour (from 8:30 to 9:00).	
	B	The student has only considered the time for which Mariam was travelling faster than 80 kilometres per hour (from 9:00 to 9:45).	
	C	The student has considered the time taken from reaching 80 kilometres per hour at 8:30 to reaching fastest speed at 9:30.	

<b>7</b>	<b>Key</b>	<b>D</b>	<p>The distance for route 1 will be <math>1179 + 492 = 1671</math> km.</p> <p>The distance for route 2 will be <math>880 + 382 + 380 = 1642</math> km.</p> <p>The distance for route 3 will be <math>790 + 372 + 492 = 1654</math> km.</p> <p>The distance for route 4 will be <math>975 + 280 + 360 = 1615</math> km.</p> <p>Therefore, route 4 is the shortest.</p>
	<b>Distractors</b>		
	<b>A</b>	See above.	
	<b>B</b>	See above.	
<b>8</b>	<b>Key</b>	<b>C</b>	<p>Three small cartridges can print 1800 (<math>600 \times 3</math>) pages and this is the same number of pages that can be printed by two medium cartridges. So, one medium cartridge can print 900 pages. Therefore, 5 medium cartridges can print 4500 (<math>900 \times 5</math>) pages.</p> <p>This is the same number of pages that can be printed by large cartridges. So, one large cartridge can print 1500 (<math>4500 \div 3</math>) pages.</p>
	<b>Distractors</b>		
	<b>A</b>	Considered that the medium cartridge can print as many pages as the small cartridge.	
	<b>B</b>	Considered that the ratio of the pages printed by the medium and the large cartridges is the same as the ratio of the pages printed by the small and medium cartridges.	
	<b>D</b>	Considered that one medium cartridge can print 1800 pages.	
<b>9</b>	<b>Key</b>	<b>B</b>	As the skateboard falls its speed increases and as it rises its speed decreases.
	<b>Distractors</b>		
	<b>A</b>	The student thinks that the speed decreases steadily from X to Z.	
	<b>C</b>	The student thinks that the speed increases steadily from X to Z.	
	<b>D</b>	The student thinks that the speed increases steadily from W to Y.	

<b>10</b>	<b>Key</b>	<b>D</b>	<p>The interest amount received by Mohammed from Glory Bank at the end of the second year is:  <math>1500 \times 0.01 + 1515 \times 0.01 + 2000 \times 0.016 = \text{BD } 62.150</math></p> <p>The interest amount received by Mohammed from Elite Bank at the end of the second year is:  <math>1500 \times 0.011 + 1516.500 \times 0.011 + 2000 \times 0.013 = \text{BD } 59.182</math></p> <p>The interest amount received by Mohammed from Port Bank at the end of the second year is:  <math>1500 \times 0.012 + 1518 \times 0.012 + 2000 \times 0.015 = \text{BD } 66.216</math></p> <p>The interest amount received by Mohammed from Forefront Bank at the end of the second year is:  <math>1500 \times 0.013 + 1519.500 \times 0.013 + 2000 \times 0.014 = \text{BD } 67.254</math></p> <p>Therefore, Mohammed will deposit his money in Forefront Bank to receive the highest interest.</p>		
			<b>Distractors</b>		
			<b>A</b>	See above.	
			<b>B</b>	See above.	
			<b>C</b>	See above.	

11	Key	B	<p>By a systematic search, the amount saved by Sami, which is BD 50 is divided by the daily incentive he gets, which is BD 7, so the result is 7.14.</p> <p>If we assume that the number of days in which Sami worked is 8 days, then he will get BD 56. The difference is BD 6 compared to the total saved amount, which is not divisible by 5.</p> <p>If we assume that the number of days in which Sami worked is 9 days, then he will get BD 63. The difference is BD 13 compared to the total saved amount, which is not divisible by 5.</p> <p>If we assume that the number of days in which Sami worked is 10 days, then he will get BD 70. The difference is BD 20 and he goes out with his friends for 4 days.</p> <p>The minimum number of days that Sami worked is 10. Therefore, the minimum number of hours is 20.</p>	
			<b>Distractors</b>	
			A	The minimum number of days in which Sami worked to save BD 50.
			C	The amount saved by Sami, which is BD 50 is divided by the difference between the amount that Sami got from work and the amount spent in going out with his friends, which is BD 2.
			D	It is not the minimum number of hours $15 \times 7 - 11 \times 5 = 50$ .
12	Key	D	<p>Manar can choose meat only in 4 different ways, cheese only in 3 different ways and a combination of meat and cheese in <math>4 \times 3 = 12</math> different ways. This means that there are 19 different ways of filling the sandwiches.</p> <p>Each filling can be put into 3 different types of bread so the total number of different kinds of sandwiches is <math>19 \times 3 = 57</math>.</p>	
			<b>Distractors</b>	
			A	This is the number of different ways of filling the sandwiches.
			B	This adds the number of different types of bread to the number of different ways of filling the sandwiches.
			C	This only considers sandwiches that contain both meat and cheese.

13	<b>Key</b>	<b>A</b>	Apples BD 0.800 Oranges BD 0.650 Bananas BD 0.600 Other fruits (mango & tomato) BD 0.900  Total BD 2.950
	<b>Distractors</b>		
	<b>B</b>	Uses BD 1.000 for the combined price of the other 2 fruits.	
	<b>C</b>	Uses BD 1.000 for the price of the apples.	
	<b>D</b>	Uses BD 1.000 for the price of the apples & uses BD 1.000 for the combined price of the other 2 fruits.	
14	<b>Key</b>	<b>B</b>	Since the number of adults was 130, and the number of women was 96, then the number of men was $130 - 96 = 34$ . Since the number of adults studied Spanish was 73, and the number of women studied Spanish was 55, then the number of men studied Spanish was $73 - 55 = 18$ . Out of the 34 men, 9 studied Germany and 18 studied Spanish, so the number of men studied French was $34 - 9 - 18 = 7$ . Therefore, the number of adults studied French: $12 + 7 = 19$
	<b>Distractors</b>		
	<b>A</b>	This is the number of men studied French.	
	<b>C</b>	This is the number of women studied Germany.	
	<b>D</b>	This is the number of adults studied Germany.	
15	<b>Key</b>	<b>C</b>	By subtracting the price of a small pizza, a medium pizza, a large pizza and the change of 200 fils the balance would be BD 20.200.  To benefit from the offer, the medium pizzas must be the most of what she paid for. A systematic search will reveal that 1 small pizza, 6 medium pizzas and 2 large pizzas were paid for. So, she received a total of 17 ( $1 + 6 \times 2 + 2 \times 2$ ) pizzas.
	<b>Distractors</b>		
	<b>A</b>	By paying for 3 small pizzas, 2 medium pizzas and 4 large pizzas, the total number of pizzas was not the largest.	
	<b>B</b>	By paying for 2 small pizzas, 4 medium pizzas and 3 large pizzas, the total number of pizzas was not the largest.	
	<b>D</b>	By paying for 8 medium pizzas and 1 large pizza, but not paying for a small pizza.	

16	<b>Key</b>	<b>D</b>	This chart is consistent with the given information					
	<b>Distractors</b>							
	<b>A</b>	Visitors from Kuwait must be less than the visitors from KSA.						
	<b>B</b>	Visitors from Bahrain must be less than the visitors from UAE.						
	<b>C</b>	Visitors from Kuwait must be more than the visitors from Qatar.						
17	<b>Key</b>	<b>D</b>	Number of final votes for candidates is:					
			Candidate	Farouq	Reem	Nizar	Suha	Faisal
			Number of votes	4800	3000	5600	3600	4400
	<b>Distractors</b>							
	<b>A</b>	The number of votes for Nizar in the chart is 5000 instead of 5600.						
	<b>B</b>	The number of votes for Reem in the chart is 3600 instead of 3000.						
	<b>C</b>	The number of votes for Faisal in the chart is 5100 instead of 4400.						
18	<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 $10 + 2 \times 4.4 + 3 \times 4 + 1 \times 3.6 = 34.4$						



19	<b>Key</b>	<b>B</b>	The maximum number of days on which Mohammed went to the market during the month was at most 22 days. Mohammed paid a total of BD 32.500 for parking the car one day for at most one hour, parking the car 18 days for two hours, and losing the ticket on 2 days.
	<b>Distractors</b>		
	<b>A</b>		Mohammed could have paid a total of BD 32.500 for parking the car one day for at most one hour, parking the car 15 days for two hours, losing the ticket for one day, and picking the car after 9 pm on one day in which he parked the car for more than one hour.
	<b>C</b>		If we assumed that Mohammed parked the car for 21 days for two hours and picked the car after 9 pm on one day, the total will be BD 32 only which is less than BD 32.500.
	<b>D</b>		If we assumed that Mohammed parked the car for 22 days for two hours, the total will be BD 22 only which is less than BD 32.500.
20	<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>21</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>22</b>	<b>Key</b>	<b>B</b>	When the bus departs from the University at (e.g.) 10:40, the 10:10 bus from Muharraq will not yet have arrived at the University. The bus will arrive in Muharraq between 11:40 and 11:50, by which time the 11:10 will have departed from Muharraq.
	<b>Distractors</b>		
	<b>A</b>	The student forgets about the 10:10 bus from Muharraq.	
	<b>C</b>	The student thinks that one extra bus could pass.	
	<b>D</b>	The student thinks that two extra buses could pass.	
<b>23</b>	<b>Key</b>	<b>A</b>	Compartment number 7 is at a height of 12 m from the ground when compartment number 1 is the lowest at a height of 2 m. When a quarter of rotation is complete, the compartment number 7 is the lowest at a height of 2 m. When three quarters of rotation is complete, the compartment is in the top height at 22 m. When a full rotation is complete, the compartment goes back to the first height, i.e. 12 m.
	<b>Distractors</b>		
	<b>B</b>	Height representation of compartment number 7 when the wheel spins counter-clockwise.	
	<b>C</b>	Considering that the rotating wheel's diameter is 10 m.	
	<b>D</b>	Considering that the rotating wheel's diameter is 10 m and the wheel spins counter-clockwise.	

<b>24</b>	<b>Key</b>	<b>B</b>	Only the price for 100 leaflets in colour is important, so company 3 will be the one that I use. The cost will be BD 27. Producing the leaflets myself will cost BD 32, so the company is BD 5 cheaper.												
	<b>Distractors</b>														
	<b>A</b>	The cheapest leaflets overall will cost BD 20, but they are not on coloured paper.													
	<b>C</b>	The cheapest leaflets on coloured paper with pictures will cost BD 35.													
	<b>D</b>	If the BD 9 is taken as the whole cost, not the cost per hour, then the cost to produce them myself is BD 14, so the cheapest leaflets would be BD 13 more expensive.													
<b>25</b>	<b>Key</b>	<b>C</b>	The following table shows the old and the new regulations:												
			<table border="1"> <tr> <td>Road's speed limit (km/hr)</td> <td>50</td> <td>80</td> <td>100</td> </tr> <tr> <td>Allowed speed by the old regulations (30%) (km/hr)</td> <td>65</td> <td>104</td> <td>130</td> </tr> <tr> <td>Allowed speed by the new regulations (10%) (km/hr)</td> <td>55</td> <td>88</td> <td>110</td> </tr> </table>	Road's speed limit (km/hr)	50	80	100	Allowed speed by the old regulations (30%) (km/hr)	65	104	130	Allowed speed by the new regulations (10%) (km/hr)	55	88	110
			Road's speed limit (km/hr)	50	80	100									
			Allowed speed by the old regulations (30%) (km/hr)	65	104	130									
			Allowed speed by the new regulations (10%) (km/hr)	55	88	110									
Hasan must have driven his car at the speed of 90 km/hr. This implies that in August he was entitled for a fine of BD 200 for four contraventions and in September he was entitled for a fine of BD 600 for six contraventions.															
<b>Distractors</b>															
<b>A</b>	Under the speed of 60 km/hr Hasan would be entitled for a fine of BD 400.														
<b>B</b>	Under the speed of 80 km/hr Hasan would be entitled for a fine of BD 600.														
<b>D</b>	Under the speed of 105 km/hr Hasan would be entitled for a fine of BD 900.														

26	<b>Key</b>	<b>B</b>	$48 = \frac{2}{3} \times 72$ $72 = \frac{2}{5} \times 180$ $180 = \frac{3}{4} \times 240$ <p>The total number of members is 240, so the number of girls is <math>\frac{1}{4} \times 240 = 60</math></p>
	<b>Distractors</b>		
	<b>A</b>		$48 = \frac{2}{3} \times 72$ $72 = \frac{2}{5} \times 180$ <p>The student considers the total number of members to be 180, so the number of girls is:</p> $\frac{1}{4} \times 180 = 45$
	<b>C</b>		<p>Instead of <math>\frac{1}{4} \times 240</math> the student has calculated <math>\frac{3}{4} \times 240</math>, which is the number of boys.</p>
	<b>D</b>		This is the total number of members.
27	<b>Key</b>	<b>D</b>	<p>The profit for a sofa is BD 320.  The profit for a desk is BD 210.  The profit for a bookcase is BD 80.  The best profit is from 2 sofas and 2 desks.  <math>2 \times 320 + 2 \times 210 = \text{BD } 1060</math>.</p>
	<b>Distractors</b>		
	<b>A</b>		The profit from 1 sofa, 3 desks, and 1 bookcase.
	<b>B</b>		The profit from 3 sofas and 1 bookcase.
	<b>C</b>		The profit from 5 desks.

28	<b>Key</b>	<b>B</b>	At station Y, before the new passengers got on, there were 270 passengers (320 – 50) Before the passengers got off at station Y there were 405 passengers (50% more) At station X, before the new passengers got on, there were 195 passengers (405 – 210) Before the passengers got off at station X there were 390 passengers (100% more)																																						
	<b>Distractors</b>																																								
	<b>A</b>		An increase by 33% (one third) at station Y and by 50% at station X																																						
	<b>C</b>		At each station calculates the increase and the decrease in the wrong order																																						
	<b>D</b>		Calculates with two thirds of the passengers getting off at station Y																																						
29	<b>Key</b>	<b>D</b>	The lowest cost would be Perfection: $3 \times 20 + 3 \times 50\% \times 20 = \text{BD } 90$																																						
	<b>Distractors</b>																																								
	<b>A</b>		The cost would be: $(20 - 4.5) \times 6 = \text{BD } 93$																																						
	<b>B</b>		The cost would be: $80\% \times 20 \times 6 = \text{BD } 96$																																						
	<b>C</b>		The cost would be: $4 \times 20 + 2 \times 40\% \times 20 = \text{BD } 96$																																						
30	<b>Key</b>	<b>D</b>	Two possible arrangements of the digits are:  <table style="margin-left: auto; margin-right: auto; border: none;"> <tr> <td style="padding: 0 10px;">6</td> <td style="padding: 0 10px;">5</td> <td style="padding: 0 10px;">2</td> <td style="padding: 0 20px;"></td> <td style="padding: 0 10px;">9</td> <td style="padding: 0 10px;">3</td> <td style="padding: 0 10px;">1</td> </tr> <tr> <td></td> <td></td> <td style="padding: 0 10px;">7</td> <td></td> <td></td> <td></td> <td style="padding: 0 10px;">8</td> </tr> <tr> <td></td> <td style="padding: 0 10px;">4</td> <td style="padding: 0 10px;">8</td> <td style="padding: 0 10px;">1</td> <td style="padding: 0 10px;">and</td> <td style="padding: 0 10px;">4</td> <td style="padding: 0 10px;">7</td> <td style="padding: 0 10px;">2</td> </tr> <tr> <td></td> <td></td> <td></td> <td style="padding: 0 10px;">3</td> <td></td> <td></td> <td></td> <td style="padding: 0 10px;">5</td> </tr> <tr> <td></td> <td></td> <td></td> <td style="padding: 0 10px;">9</td> <td></td> <td></td> <td></td> <td style="padding: 0 10px;">6</td> </tr> </table>	6	5	2		9	3	1			7				8		4	8	1	and	4	7	2				3				5				9				6
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				3				5																																	
			9				6																																		
<b>Distractors</b>																																									
<b>A</b>		As the four lines of three must add up to 52 and the digit 1 to 9 add up to 45, $C + E + G = 7$ (because they all appear in two lines). E must therefore be 1, 2 or 4.																																							
<b>B</b>		See above.																																							
<b>C</b>		This completes the pattern.																																							