MARK SCHEME	نموذج الإجابة وتوزيع الدرجات
KINGDOM OF BAHRAIN	مملكة البحرين
NATIONAL AUTHORITY for QUALIFICATIONS and QUALITY ASSURANCE of EDUCATION and TRAINING	الهيئة الوطنية للمؤهلات و ضمان جودة التعليم و التدريب
Directorate of National Examinations	إدارة الامتحانات الوطنية
Grade 12 National Examinations	الامتحانات الوطنية للصف الثاني عشر
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PROBLEM SOLVING	حل المشكلات
Paper 1 Problem Solving	الورقة 1 حل المشكلات

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, QQA 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.

1	**Key**	**C**	Starting from the end of the eighth week and working up through the table, gains must be subtracted and losses must be added. 80 – 2 + 2 + 1 + 2 = 83 kg
	Distractors		
	A		Student has read "same weight" and assumed that this means 80 kg.
	B		This starts with 80 kg at the end of the fourth week and works up through the table.
	D		This is his starting weight.
2	**Key**	**B**	This is the correct reflection.
	Distractors		
	A		The pencil is the wrong way round.
	C		The pen with the cap is the wrong way round.
	D		Both the pencil and the pen with the cap are the wrong way round.
3	**Key**	**C**	The chart matches the data.
	Distractors		
	A		The first bar is too high, the third one is too low and the fourth one is too high.
	B		The second bar is too high and the third one is too low.
	D		The third bar is too low and the fourth one is too high.
4	**Key**	**D**	Cost of fuel used = number of litres used × price per litre The price per litre is given (100 fils). The number of litres used is the total distance the car travelled (5 × 500 km) ÷ the distance that the car travels per litre.
	Distractors		
	A		A and B together allow calculation of how much they actually spent filling the car during the trip, which would only be the same as the cost of the fuel used if the tank had the same amount of the fuel in it at the beginning and at the end of the trip.
	B		See above.
	C		It would also be necessary to know the number of litres used per hour.

5	Key	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.
	Distractors		
	A	The student forgets about the 10:10 bus from Muharraq.	
	C	The student thinks that one extra bus could pass.	
	D	The student thinks that two extra buses could pass.	
6	Key	C	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 = BD 23.5. |
	Distractors		
	A	4.5 + 5 = BD 9.5 Only the first 0.5 kg has been considered for both packages.	
	B	4.5 + 1 + 5 + 2 = BD 12.5 Only one additional 0.5 kg has been considered for both packages.	
	D	4.5 + 5 + 5 + 12= BD 26.5 An additional 2.5 kg for Kuwait and an additional 3 kg for India have been considered.	

7	Key	B	As the skateboard falls its speed increases and as it rises its speed decreases.
	Distractors		
	A		The student thinks that the speed decreases steadily from X to Z.
	C		The student thinks that the speed increases steadily from X to Z.
	D		The student thinks that the speed increases steadily from W to Y.
8	Key	D	This combination uses 100 pieces of burger and has the correct total price of BD 110.500.
	Distractors		
	A		50 meals for two would use the correct number of pieces of burger, but the takings would be BD 130.000.
	B		10 meals for eight would use the correct number of pieces of burger, but the takings would only be BD 110.000.
	C		This combination would only use 92 pieces of burger, but does have the correct total price.
9	Key	D	Figure 3 has 4 layers, so four triangles will create two diamonds when the paper is unfolded.
	Distractors		
	A		The student considers only 2 layers and thinks that two triangles will create one diamond.
	B		The student considers 6 layers and thinks that six triangles will create three diamonds.
	C		The student has considered 4 layers, but thinks that four triangles will create one diamond and two triangles.
10	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.
	Distractors		
	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.

11			Mariam travels 75 minutes with a speed of 80 kilometres per hour or faster. $\frac{75}{150} \times 100 = 50\%$
	Key	**D**	
	Distractors		
	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.
12	**Key**	**D**	For example: If you will arrive 10 minutes early at 60 km/h and 10 minutes late at 40 km/h, your father must drive at 50 km/h for you to be on time.
	Distractors		
	A	You require the distance between the school and your home, and the time which the bell rings, in addition to the time at which you leave home.
	B	You require the distance between the school and your home, in addition to the time required to get to school if your father drives at 60 km/h.
	C	You require the distance between the school and your home, in addition to the time required to get to school if your father drives at 40 km/h.
13	**Key**	**C**	The Yellows beat the Reds in the third quarter by twice as many points as the Reds beat the Yellows in the first quarter. The second and fourth quarters were both tied.
	Distractors		
	A	According to the graph, the Reds beat the Yellows.
	B	The two teams tied.
	D	The two teams tied.

14			A search will reveal that if there were 8 sweets at the beginning, Hassan ate 4. His mother added 12 more to make 16, of which Hassan ate 8. This means that Hassan ate a total of 4 + 8 = 12.
	Key	**C**	
	Distractors		
	A	This is the number of sweets in the bowl at the beginning and at the end.	
	B	This is half of the total number of sweets.	
	D	This is the total number of sweets (8 + 12).	
15			The minibuses can make two journeys to the stadium within two hours, so can transport a total of 2 × 5 × 10 = 100 people. This leaves 250 for the big buses. 6 × 42 = 252, so there is room for all 250.
	Key	**D**	
	Distractors		
	A	This piece of information is of no help.	
	B	We already know how long it takes to reach the stadium.	
	C	It does not matter how many competitors there are, everybody will get there in time.	
16			Manar can choose meat only in 4 different ways, cheese only in 3 different ways and a combination of meat and cheese in 4 × 3 = 12 different ways. This means that there are 19 different ways of filling the sandwiches.

Each filling can be put into 3 different types of bread so the total number of different kinds of sandwiches is 19 × 3 = 57. |
	Key	**D**	
	Distractors		
	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.	

17	**Key**	**D**	D is the only graph that matches all the data.
	Distractors		
	A	Switched Muharraq's data with the Northern.	
	B	Switched Muharraq's data with the Central.	
	C	Switched the Capital's data with the Central.	
18	**Key**	**B**	$48 = \frac{2}{3} \times 72$ $72 = \frac{2}{5} \times 180$ $180 = \frac{3}{4} \times 240$ The total number of members is 240, so the number of girls is $\frac{1}{4} \times 240 = 60$
	Distractors		
	A	$48 = \frac{2}{3} \times 72$ $72 = \frac{2}{5} \times 180$ The student considers the total number of members to be 180, so the number of girls is $\frac{1}{4} \times 180 = 45$	
	C	Instead of $\frac{1}{4} \times 240$ the student has calculated $\frac{3}{4} \times 240$, which is the number of boys.	
	D	This is the total number of members.	
19	**Key**	**C**	When you fold the four triangles, two of the triangles will not be fixed on the base of the pyramid.
	Distractors		
	A	This will form a pyramid.	
	B	This will form a pyramid.	
	D	This will form a pyramid.	

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20			The cost with Golden Car is: 10 × 65% × 80 = GBP 520
	Key	**C**	The cost for 600 miles with Best Cars is: (36 × 10 + 0.15 × 600) × 1.2 = GBP 540
	Distractors		
	A		This is the 35% that has been taken off the full price of Golden Car.
	B		This is the cost of 600 miles with Best Cars before tax has been added.
	D		This is the cost for 600 miles with Best Cars.
21			Hanan needs the following:
			1.8 kg of sugar = 2 bags: cost GBP 3.00
			2.1 kg of flour = 3 bags: cost GBP 3.60
	Key	**C**	30 eggs = 3 boxes: cost GBP 8.10
			240 ml of milk = 1 bottle: cost GBP 0.90
			45 ml of vanilla = 1 bottle: cost GBP 1.20
			The total cost is: GBP 16.80.
	Distractors		
	A		The student adds each of the prices shown in the cost column of the table and multiplies by 1.5.
	B		The student thinks that only 2 bags of flour are needed.
	D		The student thinks that 3 bags of sugar are needed.
22			If tax is paid at 20% on the full amount of GBP 35000, the total will be GBP 7000. David must have a paid a further GBP 1610 at the 40% rate:
	Key	**C**	1610 ÷ 0.4 = GBP 4025.
			He must have earned:
			7475 + 35000 + 4025 = GBP 46500.
	Distractors		
	A		The student adds GBP 4025 to GBP 35000 and forget to include the tax free GBP 7475.
	B		The student calculates GBP 8610 divided by 0.2, which pays 20% tax on the whole of the income.
	D		The student calculates GBP 8610 divided by 0.2 and adds the tax free GBP 7475.

23	Key	D	The lowest cost would be Perfection: 3 × 20 + 3 × 50% × 20 = BD 90
	Distractors		
	A		The cost would be: (20 – 4.5) × 6 = BD 93
	B		The cost would be: 80% × 20 × 6 = BD 96
	C		The cost would be: 4 × 20 + 2 × 40% × 20 = BD 96
24	Key	A	The number of hours required is as follows: 20 thoubs × 7 hr = 140 hr 10 thoubs × 5 hr = 50 hr 5 thoubs × 2 hr = 10 hr Total = 200 hr Since the cost of sewing is BD 1 per hour, the total cost is BD 200. Total selling price would be: (20 × 14) + (10 × 10) + (5 × 8) = BD 420 Profit = 420 – 200 – 114 (the cost of the fabric) = BD 106.
	Distractors		
	B		The student forgets to include the cost of the fabric.
	C		The student forgets to include the cost of sewing the fabric.
	D		The student adds the cost of sewing the fabric instead of subtracting it.

25			Two possible arrangements of the digits are:
	Key	**D**	6 5 2 9 3 1 7 8 4 8 1 and 4 7 2 3 5 9 6
	Distractors		
	A		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		See above.
	C		This completes the pattern.
26	**Key**	**B**	140 from Al-Najah + 120 from Al-Rehab + 110 from Al-Resala 5th grade + 45 from other schools + 21 repeaters from Al-Resala in 6th grade – 52 from Al-Resala = 384
	Distractors		
	A		This fails to include the 21 repeaters from Al-Resala in 6th grade.
	C		This includes total number of students in 5th grade and fails to subtract 5th grade repeaters.
	D		This includes 108 4th grade students from Al-Nahdha.
27	**Key**	**B**	A systematic search reveals that the following numbers have won a prize: 4795, 4975, 6397, 6487, 6847, 6937, 7198 and 7468.
	Distractors		
	A		The student does not reverse any of the middle pairings (e.g. includes 4795 but not 4975).
	C		The student includes 7648 and 7918, which are greater than 7500.
	D		The student forgets that all 4 digits must be different, so includes 4885, 5596, 5686, 5776, 5866, 5956, 6577, 6667, 6757, 7288 and 7378.

28	Key	C	For a bill of BD 21.300: Gold package = (21.3 − 15) ÷ 0.075 = 84 minutes. Silver package = (21.3 − 2.5) ÷ 0.2 = 94 minutes. So for October the Silver package gave the lower bill. For a bill of BD 23.700: Gold package = (23.7 − 15) ÷ 0.075 = 116 minutes. Silver package = (23.7 − 2.5) ÷ 0.2 = 106 minutes. So for November the Gold package gave the lower bill.
	Distractors		
	A		A, B and D are the other three possible combinations.
	B		See above.
	D		See above.
29	Key	B	A suitable starting point for a search is to try a certain number of students in either Grade 11 or 12. Choosing, for instance, Grade 11, if there are 325 students, 130 of them (40%) voted for Salman. This means that 95 students in Grade 12 voted for Salman. The 95 students represent 25% of Grade 12, so there are 380 students in Grade 12. Therefore, Grade 12 students are more than Grade 11 students with 380 − 325 = 55.
	Distractors		
	A		This is the difference between the Grade 11 students (130) and Grade 12 students (95) who voted for Salman.
	C		This is the difference between the Grade 11 students (195) and Grade 12 students (285) who voted for Hussain.
	D		This is the difference between the Grade 11 students (195) who voted for Hussain and Grade 12 students (95) who voted for Salman.

30	Key	C	Fatima left 8 toffees which she thought was two thirds, so she found 12 toffees and she ate 4. Abeer left 12 toffees which she thought was two thirds, so she found 18 toffees and she ate 6. Rawan left 18 toffees which was two thirds, so she found 27 toffees and she ate 9. Fatima was given 5 toffees and Abeer was given 3 toffees by Amal to make things fair.
	Distractors		
	A	This is the number of toffees given to Abeer.	
	B	This is the number of toffees already eaten by Fatima.	
	D	This is the number of toffees already eaten by Abeer.	