F4 January Exam 2021 Physics

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	B	C	B	B	C	C	A	D	D	B	B	A	B	A
16	17	18*	19	20	21	22	23	24	25	26	27	28	29	30
A	A	A	B	B	C	C	D	C	B	A				

* Duplicate of 1 sorry! Miss out?

27.

Question	Answer	Marks
1(a)(i)	(x =)½ $v_i t$ **or** ½ × 12 × 30 **or** (x =)½ at^2 **or** ½ × 0.40 × 30^2	**C1**
	180 m	**A1**
1(a)(ii)	(a =)$\Delta v / t$ **or** 12 / 30	**C1**
	0.40 (m / s^2) **or** 12 / 30	**C1**
	(F =)ma **or** 2.0 × 10^4 × 0.40 **or** 2.0 × 10^4 × 0.40 × 12 / 30	**C1**
	8000 N	**A1**
1(b)	drag / friction / air resistance mentioned	**C1**
	drag / friction / air resistance increases (as speed increases)	**A1**

28.

Question	Answer	Marks
1(a)(i)	Distance = area under graph OR 0.5 × 20 × 13	**C1**
	130 m	**A1**
1(a)(ii)	(a =) (v – u) / t OR (a =) v / t OR 13 / 20	**C1**
	0.65 m / s^2	**A1**
1(a)(iii)	(F =) ma OR 1200 × 0.65	**C1**
	= 780 N	**A1**
1(b)	Acceleration decreases OR rate of increase of speed decreases OR speed increases at a lower rate	**B1**

29.

Question	Answer	Marks
2(a)	Extension of a spring is (directly) proportional to load / force / weight OR $F = ke$ where e is extension	**B1**
2(b)(i)	Straight line drawn from origin to (64 mm, 120 N)	**B1**
2(b)(ii)	$F = ke$ in any form OR 120 / 64 OR 120 / 6.4 OR 120 / 0.064	**C1**
	c.a.o. 1.9 N / mm OR 19 N / cm OR 1900 N / m	**A1**
2(c)	Above 120 N / at 140 N, the spring does not obey Hooke's law OR the extension is not proportional to the load / weight / force	**B1**
	The elastic limit / limit of proportionality of the spring has been exceeded	**B1**

30.

Question	Answer	Marks
3(a)	(Measure of) quantity / amount of matter OR (property) that resists change in motion / speed / momentum OR measure of a body's inertia	**B1**
3(b)(i)	$d = m / V$ OR in words OR 0.44 / 0.080^3 OR 0.44 / 5.12×10^{-4} OR 440 / 8^3 OR 440 / 512 OR 0.44 / 8^3 OR 0.44 / 512	**C1**
	0.86 g / cm^3 OR 860 kg / m^3 OR 8.6×10^{-4} kg / cm^3	**A1**
3(b)(ii)	Sinks OR does not float AND (cube) denser (than oil)	**B1**
3(c)(i)	$W = mg$ OR (g =) W / m OR 0.70 / 0.44	**C1**
	1.6 N / kg	**A1**
3(c)(ii)	(P =) hdg OR $0.030 \times 850 \times 1.6$	**C1**
	41 Pa	**A1**

31.

Question	Answer	Marks
2(a)	$P \times 1.5$	**B1**
2(b)(i)	($W \times 1.0$ OR 210×1.0 =) 210 N m	**B1**
2(b)(ii)	$P \times 1.5 = 210$ OR $P = 210 / 1.5$	**C1**
	140 N	**A1**
2(b)(iii)	$P + Q = 210$ OR $140 + Q = 210$ OR $Q \times 1.5 = 210 \times 0.5$ OR $Q = 210 \times 0.5 / 1.5$ OR $P \times 0.5 = Q$	**C1**
	Q = 70 N	**A1**