11	**(a)**		$m = \frac{k}{t}$, so $t = 5,\ m = 2.1 \Rightarrow k = 10.5$ When $t = 50, m = \frac{10.5}{50} = 0.21$, oe EITHER The model fits the measurements because the prediction agrees with given value OR The model fits the measurements because the same value of k is obtained in each case	**M1** **M1** **A1** **[3]**	**2.1** **2.1** **2.2a**	Using algebraic expression to represent proportionality and one pair of values in attempt to find k Uses the model to predict the value of m for the other value of t, or uses the other pair of values to check the value of k Makes suitable statement about consistency of results	oe with $t = 50, m = 0.21$ e.g. $\therefore \quad m = \frac{10.5}{t}$
			Alternative argument When the value of t is multiplied by 10, the value of m is divided by 10 So [consistent with the model that] mass is inversely proportional to time.	**M2** **A1** **[3]**		Argument in words need not reference the constant of proportionality Must make a clear conclusion about inverse proportionality	
11	**(b)**	**(i)**	When t is small, $m = \frac{10.5}{t}$ is large, so the mass will not be modelled correctly.	**B1** **[1]**	**3.5a**	Any suitable comment that identifies a problem at $t = 0$ or as $t \to 0$	
11	**(b)**	**(ii)**	Melts completely when $m = 0$, but $t = \frac{10.5}{0}$ is not defined so the model cannot be used	**B1** **[1]**	**3.5a**	Any suitable comment explaining that the model will not give a time for $m = 0$	Allow for "the model does not give a time for which $m = 0$" oe

11	**(c)**		Substitute $t = 5,\ m = 2.1 \Rightarrow 2.1 = 5a + b$ Substitute $t = 50,\ m = 0.21 \Rightarrow 0.21 = 50a + b$ Solving simultaneously: $a = -0.042,\ b = 2.31$	**M1** **M1** **A1** **[3]**	**3.3** **1.1a** **1.1**	Uses either data point to form equation Uses the other data point to find 2nd equation and solve simultaneously Both values required	Solution may be **BC**
			Alternative method gradient of line joining points (5,2.1) and 50,0.21) $\frac{2.1-0.21}{5-50} = -0.042$ So line is of the form $y - 2.1 = -0.042(x - 5)$ $y = -0.042x + 2.31$	**M1** **M1** **A1** **[3]**		Attempt to find gradient Uses either data point to complete the equation Award for the correct equation without reference to a and b	
11	**(d)**		a is the rate at which ice melts: 0.042 kg of ice is lost per hour b is the initial mass of the block: 2.31 kg	**B1** **B1** **[2]**	**3.3** **3.3**	Must refer to the value found; FT their negative a FT their positive b	If no reference is made to the numerical values, allow **SC1** for 'a is the rate at which ice melts and b is the initial mass of the block' oe
11	**(e)**		$m = 0 \Rightarrow 0 = -0.042t + 2.31 \Rightarrow t = \frac{2.31}{0.042} = 55$ so time for block to melt is 55 hours	**B1** **[1]**	**3.4**	FT their a and b only if t is positive	