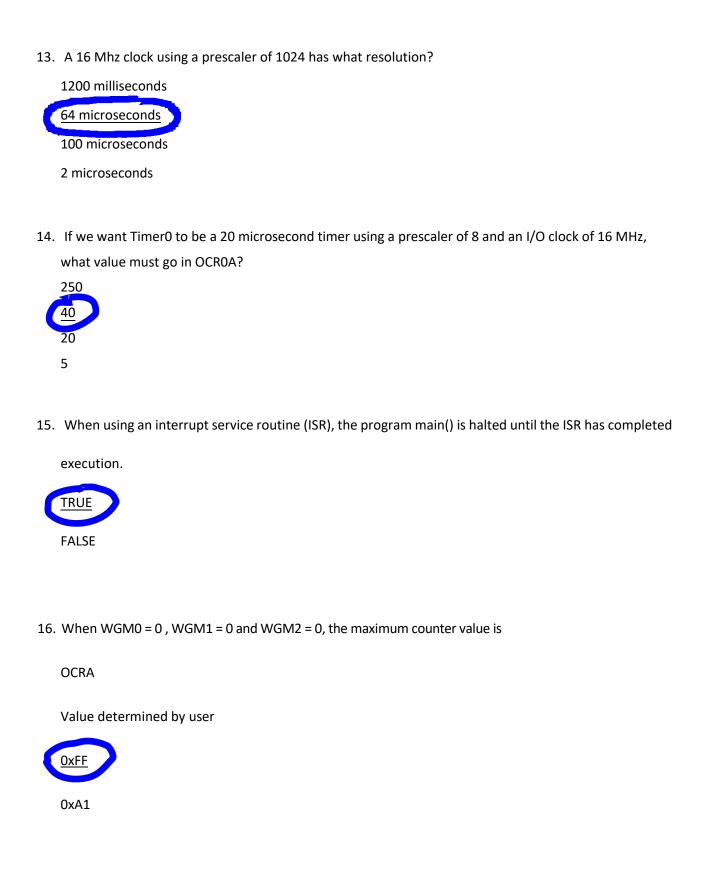
1.	What is the bitwise AND of 0x8B and 0x55?
	0x11
	<u>0x01</u>
	0xEB
	0xF0
2.	What is the bitwise XOR of 0xDE with 0xA9?
	0x1F
	0x05
	<u>0x77</u>
	0xC0
3.	PORTB = 0x38. What is the value of PORTB for the following operation?
	PORTB &= ~(1 << PORTB5);
	<u>0x18</u>
	0xF8
	0xB1
	0x31
4.	What is the value of PORTC for the following operations?
	PORTC = 0x5B;
	num = 0x04;
	PORTC = (PORTC & 0xF0) (num & 0x0F);
	0xCC
	0xDF
	0x3E
	<u>0x54</u>

5.	Which Port Register bit do you initialize when using digital Pin 51 on the Arduino development board as the connection to an LED circuit?
	PORTA1
	PORTC6
	PORTB2
	PORTB3
6.	Which Special Function Register (SFR) selects whether the pin is configured as input or output?
	PORTxn
	PINxn
	<u>DDRxn</u>
7.	Which SFR is used for reading in a value from an external pin?
	PORTxn
	<u>PINxn</u>
	DDRxn
8.	Which SFR is used for output to the pin (logic 0 or logic 1)?
	<u>PORTxn</u>
	PINxn
	DDRxn

9.	If PORTxn is written logic one when the pin is configured as an input pin, the pull-up resistor is activated.
	TRUE
	FALSE
10.	What does the following line of code do?
	if(PINB & (1 << PINB2))
•	Conditional statement: if Digital pin #51 on Arduino Board is logic high;
	Conditional statement: if Digital pin #51 on Arduino Board is logic low;
	Conditional statement: if Digital pin #50 on Arduino Board is logic high;
	Conditional statement: if Digital pin #50 on Arduino Board is logic high;
11.	Which component is used to slow down the I/O clock for timers/counters?_
	Output Compare Register
	<u>Prescaler</u>
	Counting Register
	Push Button Switch
12.	For a 16 Mhz I/O clock, an 8 bit compare value of 125 and a prescaler of 256 - What is the timer
	duration?
	64 microseconds
	100 milliseconds

2 milliseconds

20 milliseconds



17.	To use Digital Pin # 51 on the Arduino Board as a pin change interrupt, which Interrupt Vector do you
	use in your program?
	PCINT3_vect
	PCINT2_vect
	PCINT1_vect
	PCINTO_vect
18.	You can use a timer interrupt to compare the timer count to a specific value.
	TRUE
	FALSE
	What is the maximum time duration assuming a 16 MHz clock, a 16-bit timer, and available pre-scaler values are 1, 8, 64, 256?
	4.09 milliseconds
(1.04 seconds
	4.19 seconds
	32.77 milliseconds
20.	What would be the ISR macro for the Timer0 overflow event?
,	TIMERO_COMPB_vect
	TIMERO_COMPA_vect
	TIMERO_OVF_vect
	TIMRO_OVF

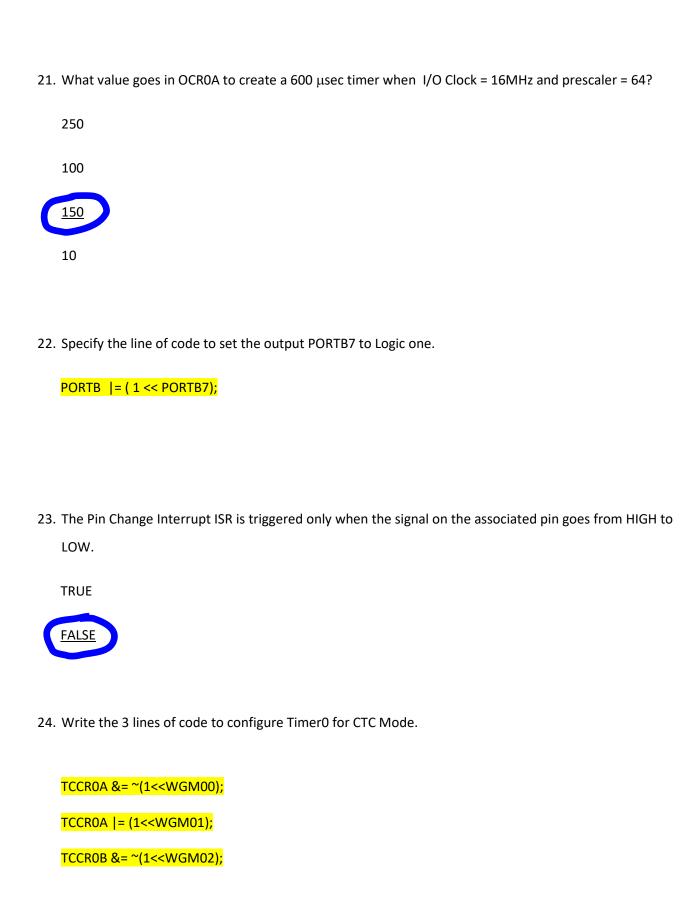


Table 14-1. Reset and Interrupt Vectors

Vector No.	Program Address ⁽²⁾	Source	Interrupt Definition
1	\$0000(1)	RESET	External Pin, Power-on Reset, Brown-out Reset, Watchdog Reset, and JTAG AVR Reset
2	\$0002	INT0	External Interrupt Request 0
3	\$0004	INT1	External Interrupt Request 1
4	\$0006	INT2	External Interrupt Request 2
5	\$0008	INT3	External Interrupt Request 3
6	\$000A	INT4	External Interrupt Request 4
7	\$000C	INT5	External Interrupt Request 5
8	\$000E	INT6	External Interrupt Request 6
9	\$0010	INT7	External Interrupt Request 7
10	\$0012	PCINT0	Pin Change Interrupt Request 0
11	\$0014	PCINT1	Pin Change Interrupt Request 1
12	\$0016 ⁽³⁾	PCINT2	Pin Change Interrupt Request 2
13	\$0018	WDT	Watchdog Time-out Interrupt
14	\$001A	TIMER2 COMPA	Timer/Counter2 Compare Match A
15	\$001C	TIMER2 COMPB	Timer/Counter2 Compare Match B
16	\$001E	TIMER2 OVF	Timer/Counter2 Overflow
17	\$0020	TIMER1 CAPT	Timer/Counter1 Capture Event
18	\$0022	TIMER1 COMPA	Timer/Counter1 Compare Match A
19	\$0024	TIMER1 COMPB	Timer/Counter1 Compare Match B
20	\$0026	TIMER1 COMPC	Timer/Counter1 Compare Match C
21	\$0028	TIMER1 OVF	Timer/Counter1 Overflow
22	\$002A	TIMERO COMPA	Timer/Counter0 Compare Match A
23	\$002C	TIMER0 COMPB	Timer/Counter0 Compare match B
24	\$002E	TIMER0 OVF	Timer/Counter0 Overflow
25	\$0030	SPI, STC	SPI Serial Transfer Complete
26	\$0032	USART0 RX	USART0 Rx Complete
27	\$0034	USARTO UDRE	USART0 Data Register Empty
28	\$0036	USART0 TX	USART0 Tx Complete
29	\$0038	ANALOG COMP	Analog Comparator
30	\$003A	ADC	ADC Conversion Complete

 Table 16-8.
 Waveform Generation Mode Bit Description

Mode	WGM2	WGM1	WGMo	Timer/Counter Mode of Operation	ТОР	Update of OCRx at	TOV Flag Set on ⁽¹⁾⁽²⁾
0	0	0	0	Normal	0xFF	Immediate	MAX
1	0	0	1	PWM, Phase Correct	0xFF	TOP	воттом
2	0	1	0	CTC	OCRA	Immediate	MAX
3	0	1	1	Fast PWM	0xFF	TOP	MAX
4	1	0	0	Reserved	_	_	-
5	1	0	1	PWM, Phase Correct	OCRA	TOP	воттом
6	1	1	0	Reserved	_	_	-
7	1	1	1	Fast PWM	OCRA	воттом	TOP

Note: 1. MAX = 0xFF

2. BOTTOM = 0x00

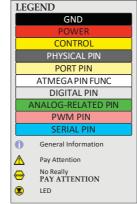
16.9.1 TCCR0A - Timer/Counter Control Register A

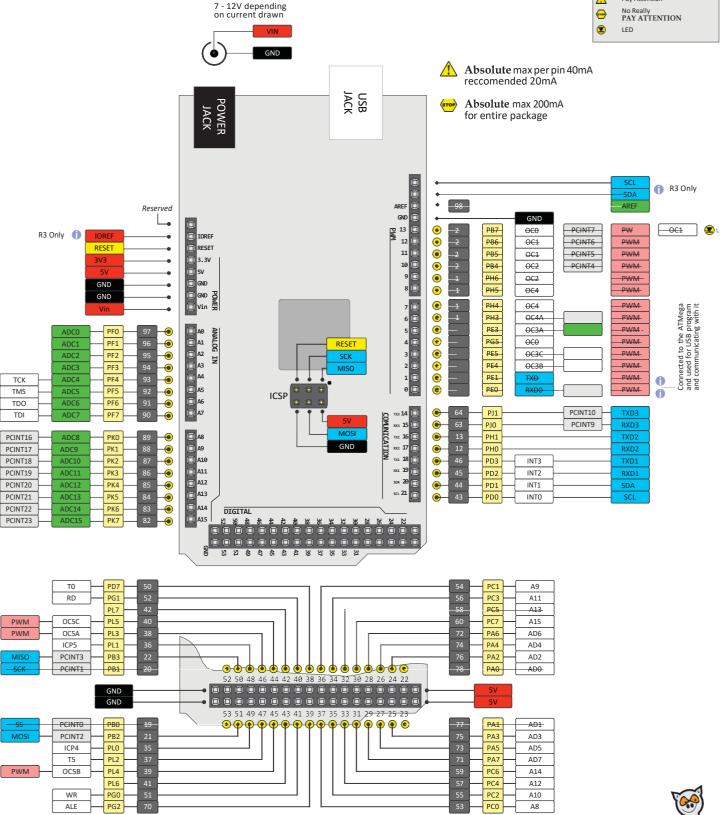
Bit	7	6	5	4	3	2	1	0	
0x24 (0x44)	COM0A1	COM0A0	COM0B1	COM0B0	-	-	WGM01	WGM00	TCCR0A
Read/Write	R/W	R/W	R/W	R/W	R	R	R/W	R/W	•
Initial Value	0	0	0	0	0	0	0	0	

16.9.2 TCCR0B – Timer/Counter Control Register B

Bit	7	6	5	4	3	2	1	0	_
0x25 (0x45)	FOC0A	FOC0B	_	_	WGM02	CS02	CS01	CS00	TCCR0B
Read/Write	W	W	R	R	R/W	R/W	R/W	R/W	-
Initial Value	0	0	0	0	0	0	0	0	

PINOUT DIAGRAM





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В	HEX			
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	Α
1	0	1	1	В
1	1	0	0	С
1	1	0	1	D
1	1	1	0	E
1	1	1	1	F